ESSAYS ON INSURANCE ECONOMICS

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Abstract

Is the relationship between insurance consumption and its determinants spurious? Is general insurance a luxury service? Do bequest motives matter for life insurance consumption? Is private credit important for the development of life insurance? Do socioeconomic development and informal risk sharing institutions matter for formal insurance consumption? This thesis investigates these and other related issues using international datasets and relatively new panel data method, namely the Common Correlated Effects Pooled (CCEP) estimator. A novelty of the CCEP is that it takes into account the impacts of unobserved common factors. The thesis consists of an introduction, three empirical chapters and conclusions.

Chapter 2 studies the relationship between nonlife insurance consumption and income/wealth per capita. Estimation results suggest that income elasticity is below unity and that nonlife insurance is positively related to GDP per capita, the law, risk aversion, infrastructural development, and negatively related to socioeconomic development.

Chapter 3 explores life insurance consumption driven by bequest motives. We found that life insurance consumption is positively related to GDP per capita, old age dependency ratio, infrastructural development, and social security and welfare; and negatively related to the extended family institution, savings, inflation, and risk aversion. Estimation results suggest the presence of altruistic, and bequest as exchange old age security motives.

Chapter 4 investigates the long run relationship and causality direction between private credit consumption and life insurance development. Life insurance development may be explained by GDP per capita, formal and informal credit consumption, infrastructural development, life expectancy, institutional quality, inflation, and Islam, and Orthodox being the dominant religions.

Cointegration test results suggest that life and nonlife insurance consumption and its determinants exhibit a long run relationship; and that there is a long run bi-directional causality relationship between life insurance development and private credit consumption.

The thesis concludes that insurance development requires institutional and infrastructural development-in particular- telecommunications infrastructure, to facilitate cost effective insurance supply.

Keywords: life insurance, nonlife insurance, private credit, bequest motives, old age security, informal risk sharing institutions.

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Chapter 1:

Insurance Consumption across Countries: An Introductory Chapter

1.1. Introduction

This chapter aims at highlighting objectives, motivations, and contributions of this thesis. To this end, the chapter provides an overview of the theory of the demand for insurance and international empirical studies on insurance consumption. The chapter is structured as follows: Section 1.2 highlights the background of the study. Section 1.3 brings to light the theory of the demand for insurance. Section 1.4 briefly describes state dependent utility and its implication for optimal insurance coverage. Section 1.5 provides an overview of the theory of the demand for life insurance. Objectives of the study are described in Section 1.6. Section 1.7 presents motivation and research questions for the study. Contributions and organisations of the thesis are in Sections 1.8 and 1.9, respectively.

1.2. Background

The insurance sector plays an important role in bearing risks that face people in contemporary societies. According to Swiss Re (2010) world-wide insurance premiums in 2009, adjusted for inflation, amounted to USD 4066 billion. Of which, according to Swiss Re, life insurance premiums accounted for about USD 2330 billion, and non-life premiums accounted for about USD 1736 billion. A closer look at the figures suggests that there is an uneven distribution of insurance consumption across countries at different stages of socio-economic development. Swiss Re (2010) shows that of the world-wide written premiums in 2009, industrialized countries accounted for USD 3533 billion, and emerging and developing economies accounted for USD 533 billion. However, insurance growth varies between developing and industrialised countries.

For instance, during the period 1980-2008 world-wide insurance premiums experienced real annual growth of, on average, about 4 percent. During the same period, while annual real growth of insurance premiums in industrialized countries accounted, on average, for about 3.9 percent; annual real growth of insurance premiums in emerging and developing economies accounted, on average, for about 9 percent, Swiss Re (2009).

The figures may highlight the importance of analyzing factors that influence the demand for insurance and insurance development in an economy and insurance consumption variation across countries. While some existing empirical research focuses on income per capita (Beenstock, Dickinson and Khajuria, 1988; Outreville, 1990; Enz, 2000), others emphasize, among other things, on institutional quality (Ward and Zurbruegg, 2002; Beck and Webb, 2003; and Esho et al, 2004) and cultural aspects (Park, Borde and Choi, 2002; Chui, and Kwok, 2009; and Park and Lemaire, 2011) to explain such insurance consumption (growth) variation across countries. In this context, Zheng, Liu, and Deng (2008) suggest that the role of institutions in insurance growth decreases as the economy develops. Hence, according to this view, recent high insurance growth rates in emerging economies are mainly driven by institutions, while in industrialized countries are driven by economic growth. The authors also suggest that variations in culture and religion are non-systematic (random) and will not affect the world's average insurance growth level.

1.3. The theory of the Demand for Insurance

A natural question that arises is why people purchase insurance coverage. The primary motive is that people do so in order to avoid risk (uncertainty). In the analysis of choice under uncertainty it is common to denote an outcome of an uncertain event as the state of the world, which is assumed to be exogenous and is chosen by nature, Hirshliefer and Riley (1992, pp.7-8). For simplicity one may consider only two possible states of the world, a loss of a wealth versus non loss, or a loss of person's life (dead) versus non loss (alive). In facing uncertainty about what a state of the world may occur, people use insurance to transfer wealth/income/consumption from one state of the world to the other, Frech III (1994, p.264).

More specifically, the standard analysis of uncertainty suggests that the demand for insurance is motivated by two assumptions about human behaviour, namely: (i) individual's endeavour to maximize the expected utility of her income (wealth), and (ii) the principle of diminishing marginal utility of income (wealth). These two assumptions were formulated by Daniel Bernoulli (1738). The Bernoulli assumptions can be applied, thanks to the von Neumann-Morgenstern's axioms (1953)[1] on rational behaviour that ensure coherent decisions by an expected utility maximizing individual.

Based on these premises Arrow (1971, 1996) formulated the theory of the demand for insurance using a contingent claims approach/ the mutuality principle. Assuming an economy where risk is given by nature, public information, expected utility maximizing economic agents, and no transaction costs, Arrow showed that it is advantageous for economic agents to share losses or insure each other. In Arrow's

[1] These axioms are (1) completeness, (2) transitivity, (3) convexity/continuity and (4) independence.

ideal economy agents can directly trade insurance or simply may agree to help each other in case of a loss.

However, due to the presence of transaction costs, in the real world, insurance is sold by insurance intermediaries. Marshall (1974) explains that insurance carriers' operations are based on the reserves principle, rather than the mutuality principle advanced by Arrow. He notes that instead of accumulating funds to meet contingencies by themselves, agents pay premiums (purchase insurance coverage) and let insurance carriers accumulate and manage the reserves.[2]

Arrow (1965) and Pratt (1964) show that a risk averse agent will be willing to pay a risk premium to get rid of risk. The risk premium depends on agent's degree of risk aversion, and can be measured by the Arrow (1965) and Pratt (1964) absolute risk aversion measure, $A(W) = -\frac{U''(W)}{U'(W)}$ and relative risk aversion measure $R(W) = -W\frac{U''(W)}{U'(W)}$ where W denotes wealth, $U'(W)$, and $U''(W)$ denote first, and second derivative of agent’s utility function, respectively. Arrow (1965) argued that the absolute risk aversion measure decreases as wealth increases. Pratt (1964, pp.122-123) also expressed a similar view.

Nevertheless, though there is a general acceptance among economists of the hypotheses of decreasing absolute risk aversion, there is less agreement about the behaviour of relative risk aversion. Arrow (1965) hypothesizes that the relative risk aversion is an increasing function of agent's wealth. Eeckhoudt and Gollier (1992, p.46) also argue that if wealth increases, the relative risk aversion does not decrease. By contrast, the logarithm utility function proposed by Bernoulli displays constant relative risk aversion. Hardaker (2000) indicates that the relative risk aversion is

[2] He illustrates the idea that pooling funds is more economical using the law of large numbers.

likely to be constant as wealth changes. Mossin (1968) has shown that if an economic agent has a decreasing absolute risk aversion and the price of insurance includes a positive loading, then the maximum acceptable premium decreases as wealth increases. Mossin's theory is valid if the loss exposure is fixed as agent's wealth increases, Schlesinger (2000). Furthermore, individual's state preferences have also implications for consumer’s optimal choice of insurance coverage.

1.4. State Dependent Utility and Optimal Insurance Coverage

The standard analysis of uncertainty suggests that individual’s utility function may or may not be a function of the state of the world. If individual's utility of her income/wealth is independent of the state of the world, then the utility function is the same regardless of the state of the world. By contrast, if individual’s utility of her income/wealth depends on the state of the world, (i.e., loss or non loss), then the utility of income is represented by two utility functions in the two states, whereby the total and marginal utility of income/wealth may be lower in the state of loss, (i.e., death of the consumer) than in the state of no loss, Hirshliefer and Riley (1992, pp. 60-62). Indeed, it has been noted that for mortality risk coverage for adults (life insurance), the marginal utility of income/consumption is lower in the state of the world where the individual is dead (Eisner and Strotz, 1962; Cook and Graham, 1977; and Hirshliefer and Riley, 1992, pp. 63-64). Individual’s state preferences have implications for the demand for insurance, i.e., individual’s choice of optimal insurance coverage.

While several types of nonlife insurance (e.g., property coverage) may be analyzed assuming state independent preferences, health and life insurance coverage may be analyzed under state dependent preferences. Mossin (1968) has shown that it is optimal for risk-averse individuals with state-independent preferences to purchase full coverage at an actuarially fair insurance price. By contrast, Cook and Graham (1977) show that it is optimal for risk averse individuals with state dependent utility function to purchase at an actuarially fair insurance price less than full coverage of the financial loss for irreplaceable commodities, e.g., good health, and the life of a spouse. Similarly, Dionne (1982) and Schlesinger (1984) show that it is optimal for a risk averse individual with state-dependent utility function to purchase less than full coverage at an actuarially fair insurance price, if individual's marginal utility of wealth/consumption decreases. Death of the individual is an extreme example of no need for insurance coverage for individual's own benefit. If individual's utility vanishes with his death, then why he/she purchases mortality coverage (life insurance) on his/her own life?

1.5. The theory of the Demand for Life Insurance: Overview

In a seminal paper, Yaari (1965)[3] identifies two basic motives for purchasing life insurance, namely bequest motives and consumption allocation over time under uncertain lifetime. Life insurance allows the sharing of lifetime uncertainty and expands the feasible set of consumption, Karni and Zilchen (1985, p.109). Zietz (2003) summarizes theoretical work on life insurance. These models may be classified as continuous and discrete models.

[3]Contemporary theoretical research on life insurance demand often takes Yaari's (1965) work as a starting point (see Håkansson, 1969; Fischer, 1973; Fortune, 1973; Karni and Zilcha, 1986; Lewis, 1989; and Bernheim, 1991). The focus of the research has been on establishing the existence of a solution for the demand for life insurance by an expected utility maximizing consumer whose lifetime is random.

1.5.1. Continuous Models

1.5.1.1. Consumption Allocation over time under Uncertain Lifetime

A motive for buying mortality risk coverage is to use the coverage as collateral for a loan/credit. Yaari (1965, p.146) analysed the demand for life insurance by a consumer, under uncertain lifetime, who has no assets and without bequest motive, but consumption allocation over time. In the set up Yaari (1965, p.146) suggests that the consumer maximizes the expected value of a Fisher[4] utility function subject to the constraint that all consumer's loans/credit must be fully insured/secured for all time. According to Yaari, when life insurance is available, the consumer maximizes the expected utility of life time consumption:

$$\max imize EV(c) = \int_0^{\bar{T}} \Omega(t)\alpha(t)g[c(t)]dt \tag{1.1}$$

$$subject \text{ to}$$

$$(1)\ c(t) \geq 0 \text{ for all t in } [0, \bar{\text{T}}].$$

$$(2)\ \text{Q(t)} = \int_0^{\bar{\text{T}}} \left\{ \exp[-\int_0^t r(x)dx] \right\} \{m(t) - c(t)\} d(t) = 0$$

where E is the expectation operator, and V is a utility function of consumption c, Ω(t) is the probability that the consumer will be alive at time t; α is the subjective discount function, and g is the utility associated with the rate of consumption at every moment of time; c(t) is the rate of expenditures on consumption at time t; Q(t) denotes consumer's assets and liabilities in actuarial notes; r(x) is the rate of interest on actuarial notes at time t and m(t) is the rate of human earnings at time t. Under such conditions, if a solution to consumer's problem exists, then, Yaari suggests that the optimal consumption plan c^* must satisfy the following fundamental differential equation:

[4] The utility function is associated with Irving Fisher as it is in line with a Fisher-type analysis of allocation over time, Yaari (1965, p.137) and that Fisher dismisses the bequest motive in his theoretical treatment, Yaari (1964, p.304).

$$\dot{c}^*(t) = -\left\{ r(t) + \frac{\dot{\alpha}(t)}{\alpha(t)} + \frac{\dot{\Omega}(t)}{\Omega(t)} \right\} \frac{g'[c^*(t)]}{g''[c^*(t)]} \tag{1.2}$$

Yaari (1965) shows that it is advantageous for the consumer without bequest motive to use actuarial notes (life insurance). Yaari (1965, p. 140) defines an actuarial note as " *a note which the consumer can either buy or sell and which stays on the books until the consumer dies, at which time it is automatically cancelled*." Yaari indicates that the consumer borrows by selling a note, which is, in effect, getting a life insured loan/credit; and saves by purchasing a note which is, in effect, the purchase of an annuity. Yaari notes that actuarial notes will have greater return than regular ones due the implied high risk, and it is advantageous for the consumer without bequest motive to hold his assets and liabilities in actuarial notes (use life insurance) during his/her entire lifetime.

1.5.1.2. Bequest Motives

Another motive for a wage earner to purchase life insurance on his/her owns life is to provide for dependents in case of premature death. Based on the life cycle model, Yaari (1965) proposes a Marshall utility function to analyze consumer's demand for life insurance using a continuous time model. The consumer faces lifetime uncertainty and has a bequest motive. In Yaari's framework the consumer maximizes the expected lifetime utility:

$$E(U(T)) = \int_0^T \alpha(t) g[c(t)dt + \beta(T)\varphi[S(T)], \tag{1.3}$$

where E is the expectation operator, U is a utility function, T (unknown) is the number of years the consumer expects to live, α is the subjective discount function, g the instantaneous utility of consumption, c, denotes the rate of expenditure on consumption, β is the subjective bequest weighting factor, φ denotes the utility of the bequest, and S denotes consumer's bequest. He showed that it is beneficial for a risk averse consumer with bequest motive to purchase actuarial fair life insurance protection and that it is optimal for the consumer to equate the marginal utility of consumption to the marginal utility of bequest at every moment. That is,

$$\alpha(t)g'[c^*(t)] = \beta(t)\varphi'[S(t)] \tag{1.4}$$

for all t.

1.5.2. Discrete Models: with and without Bequest Motives

In contrast to Yaari (1965), Håkansson (1969) studied consumer's life insurance demand using a discrete-time model. He studied the behaviour of a consumer under uncertain life time with and without bequest motive and showed that it is advantageous for the consumer to purchase life insurance. In his model the consumer maximises the expected utility of life time consumption and from the bequest left upon his death, and the purchase of life insurance coverage is driven either by the bequest motive or by the collateral motive. In Håkansson's set up the consumer without bequest motive purchases life insurance coverage in order to satisfy the constraint that he must be solvent at the time of his death.[5]

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[5] Fischer (1973) using a similar model to that of Håkansson (1969) analyzed the comparative statics and dynamics of the demand function for life insurance (i.e., both lifetime consumption and bequest functions) in a discrete-time model. In his model the consumer maximises the following utility function:

$$E[\sum_{t=1}^{T}[\tilde{\pi}_t^a U_t(C_t) + \tilde{\pi}_{t+1}^d V_{t+1}(G_{t+1})]], \quad \text{where} \quad U_t(C_t) = \frac{C_t^{1-\beta}}{1-\beta}\frac{1}{(1+\rho)^{t-1}} \quad \text{and} \quad V_t(G_t) = \hat{b}_t \frac{G_t^{1-\beta}}{1-\beta} \quad \beta > 0$$

Where $\tilde{\pi}_t^a$ and $\tilde{\pi}_{t+1}^d$ denote the probability that the consumer is alive in any period and the probability that he dies at the beginning of any period respectively; and, C_t and G_t denote consumption and bequest respectively, and $\hat{b}$ the bequest intensity. He conducted some simulations of the model to study its dynamics.

By the same token, Campbell (1980) suggested that it is advantageous for a household with bequest motive to purchase life insurance to mitigate mortality risk of the breadwinner. Using a one period model, he derived a demand function, which depends on income losses, household's risk aversion, the loading, and household's intensity for bequest. He expressed the utility function and bequest function as proportional to each other, namely $B[.] = kV[.]$, where k represents the household's intensity for bequest. Campbell discussed the properties of the bequest intensity factor, k, and suggested that it is likely to be positive but less than or equal to unity and depends among other things on the age and number of dependents in the household. By contrast, Yaari (1965), assumed some positive scalar, and Håkansson (1969) assumed the proportional constant is equal to unity. Notably, in the models discussed so far, the breadwinner makes exogenous bequest (life insurance) transfer to maximise dependents' expected utility.

However, Lewis (1989) reformulated consumer's problem so that the demand for life insurance becomes endogenous by assuming that life insurance is chosen to maximize the dependents' expected lifetime utility or equivalently dependents maximise their own utility conditional on the transfer (purchase of life insurance) while the breadwinner is alive. Using a one period life cycle model and assuming an iso-elastic utility function, the same degree of relative risk aversion for each household member, Lewis (1989) derived the demand for life insurance, which depends on the probability of the breadwinner's death, the present value of the consumption of each offspring from the current period until the age he/she leaves the household, and of the spouse over her/his remaining life span, given that the breadwinner survives, the family's wealth, risk aversion, and the policy loading charge.

1.5.3. Nominal vs Real Utility of Wealth and Life Insurance Consumption

Although life insurance contracts are often long term ones,[6] much of the theoretical models on the demand for life insurance are formulated in nominal terms (or implicitly assume contracts can be written in real terms), under the assumption that the only uncertainty that faces the consumer/agent is lifetime uncertainty. Agents are assumed to dislike risk and maximize expected utility in nominal terms.

However, Biger (1975) notes that economic theory predicts that agents' decisions are based on real terms, i.e., they are motivated by changes in relative prices and/ or changes in their initial real wealth. Therefore, it is likely that the individual will take into account not only mortality risk but also purchasing power risk when deciding on the purchase of insurance. If the rate of inflation was known in advance the individual would have accounted for it ex-ante. If the time horizon between insurance premiums payment and insurance contract settlement is very short and is likely to approach zero as in Yaari's (1965) continuous time models, anticipated purchasing power risk may have no effect on the demand for life insurance, Babbel (1981, footnote 1). By contrast, in discrete models, anticipated purchasing power risk does matter for consumer insurance decision, Babbel (1981, footnote 1).

Hofflander and Duvall (1967) were perhaps the first to hypothesize the impact of inflation on the demand for life insurance. They employed indifference curve theory to explain how an anticipated price level increase may cause a decrease in the

[6] In contrast, general insurance contracts are often short term ones, and therefore the impact of inflation on general insurance consumption is of less severity.

demand for life insurance.[7] Babbel (1981) also provides a systematic analysis of the impact of inflation on the demand for life insurance. He assumed that the only uncertainty that the consumer faces is mortality risk. Babbel derived theoretical comparative statics analysis, which suggests an inverse relationship between expected inflation and the demand for life insurance and co-movement between expected real disposable income and the demand for insurance. Babbel also assumed that inflation and interest rates are known.

However, inflation may be random and positing the risk of purchasing power. Moreover, the negative impact of inflation is likely to prevail if the coverage is intended for bequest, i.e., to provide for one's dependents in the event of death of the breadwinner. However, in case of consumer credit, the impact of inflation may be positive on life insurance consumption. That is, the consumer may need to borrow to cover his expenses, *ceteris paribus,* more in periods of high prices than in periods of low prices. Notably consumer credit is similar to policy loans. Wood (1964, p.416), indicates possible similarities and reports positive association between consumer credits and policy loans.

Permanent life insurance policies allow policyholders to borrow against their policies, Smith (1982). Policyholder's use of such a borrowing is explained, among other things, by the so called inflation hypothesis. The hypothesis predicts that increased policy holders' demand for credit in periods of high inflation to finance their increased current expenditures, Liebenberg, Carson, and Hoyt (2010, pp.651-652). Empirical work, on policy loan demand hypotheses, reports evidence for the

[7]Using USA companies' data, Hofflander, and Duvall's report a statistically significant correlation between anticipated inflation and the decrease in the sales of life policies. Most cross country empirical studies also report that the demand for life insurance is negatively related to inflation. To mitigate inflation risk, some insurers have introduced inflation indexed life policies already in the 1980s; nevertheless, inflationary periods affect the demand for life insurance negatively as demonstrated by Babbel (1981) using Brazilian life insurance consumption data before and after indexation.

inflation hypothesis (Liebenberg, Carson, and Hoyt, 2010; Schott, 1971; and Carson and Hoyt 1992).

In chapters 3 and 4 in this thesis the representative consumer is assumed to be concerned with her real utility of wealth. In the investigation of life insurance consumption driven by the bequest motive in chapter 3 we hypothesise that inflation affects life insurance consumption negatively. However, in chapter 4, in the investigation of the relationship between private credit and life insurance development we hypothesize a positive relationship between life insurance development and inflation.

1.5.4. The Relevance of Continuous and Multiperiod Models to Empirical Work

Should one use a continuous model or a discrete one in an empirical work? The link between multi-period and one-period models has been addressed by Fama (1970, p.164). Fama (1970, 1976) shows that, under some conditions, for a risk averse expected utility maximizing, the one-period objective utility function horizon summarizes optimal decisions for all future periods. Fama pointed out that the effects of distant future decision may be ignored, as in making the decision of period one, the decision in period two is weighted by the probability of the consumer being alive at that time.

Fama's analysis, and Campbell's (1980, pp.1166-1167) discussion in the context of life insurance, suggest that, consumer's multi-period problem under life uncertainty can be reduced to a seemingly one-period one. Although continuous and multi-period models may show the strength of the underlying theory of the demand for life insurance, for empirical work using real data, one may tend to employ a one period model.[8] International work on life insurance consumption employs existing one period model(s) (e.g., Browne and Kim, 1993; Beck and Webb, 2003) and test variables discussed in the theoretical models or factors thought to affect the demand for insurance. We also use a one period models in this study.

1.6. Objectives of the Thesis

This thesis empirically examines the long run economic relationship between the demand for insurance and its determinants using international data sets. We employ relatively newly developed econometric techniques for panel data that account for cross sectional dependence as well as unobserved heterogeneity to achieve the following:

a) to investigate the long run economic relationship between general insurance consumption and income per capita across countries taking into account possible omitted variables or allowing for a relatively large number of predictors;

b) to investigate the long run economic relationship between the demand for life insurance, driven by the bequest motive, and its determinants and shed light on whether types of bequest motives have implications for life insurance consumption variation heterogeneity across countries; and

c) to investigate the long run economic relationship and causality direction between life insurance development and private credit consumption across countries.

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[8] Fitzgerald (1987, p.88) states that "(m)*ultiperiod life insurance models… generally require that families compare utility in various states of the world, where different states represent different household compositions caused by the deaths of family members. Unfortunately, models of this type yield solutions not well suited to empirical work-even in the case of a single individual; the solutions are complicated functions of the underlying behavioral parameters and mortality probabilities*."

1.7. Motivation and Research Questions

This section aims at presenting research questions and motivation for exploring the research questions. A primary motivating question is that what explains observed heterogeneous insurance consumption variation across countries? Research questions include: is the relationship between insurance consumption and its determinants spurious? Is general insurance a luxury service? Do bequest motives matter for life insurance consumption? Is private credit important for the development of life insurance? Do socioeconomic development and informal risk sharing institutions matter for formal insurance consumption?

This study is motivated by the relevance of these questions to policy makers, researchers and practitioners. The study is related to an emerging literature on access to financial services, (Claessens, 2006; Claessens and Demirgus-Kunt, 2006; Beck, Demirguc-Kunt and Peria, 2007; World Bank, 2008).[9] In many countries access to financial services is limited to only 20-50 percent of the population, World Bank (2008, p.12). More specifically, the World Bank (2008, p.ix) estimates that less than half of the population in many developing countries use formal financial services, and in most of Africa less than one in five households use formal financial services. Nevertheless, it is less known, so far, about how much of the low use of financial services in many countries attributes to lack of demand and how much of it attributes to lack of supply, (Claessens, 2006, p.230). Also much less is known about the determinants and implications of access to financial services (see Beck, Demirgc-Kunt, and Honohan, 2009; World Bank, 2008, p.2). Claessens (2006, p.208) indicates that "(*m)any segments of the enterprise and household sectors lack access to finance, likely impeding their growth and reducing their welfare. What are the*

[9] Claessens (2006, p.210) distinguishes between access and use of a financial service, in that while access is availability of a supply of the financial service of reasonable quality at reasonable costs, use of a financial service is the actual consumption of the service.

barriers to wider access to financial services? Should broader availability of financial services be a public goal, and if so what are the best means of achieving it?" Recently, there has been an increasing emphasis among policy makers on building more inclusive financial systems, to improve access, to create the infrastructures that allows financial institutions to reach their optimal level, World Bank (2008, p. ix). Research on financial services access attempts to identify barriers/reasons that help to formulate a suitable policy to expand access to financial services, (Claessens, 2006; the World Bank, 2008; Beck, Demirgc-Kunt, and Honohan, 2009). The research has identified, among other things, geography, or physical access as a barrier in many developing countries for using financial services, (Claessens, 2006; Beck, Demirgc-Kunt, and Honohan, 2009). So far, the research has focused on banking services. In light of this development, this study deals with insurance services.

The study is also of relevance in light of recent developments in insurance markets and increased internationalisation of insurance industry. Since the mid-1990s the structure of insurance market in many developing countries has experienced a transformation from a more monopolistic, locally ownership to allow for (foreign direct investment in form of) international insurance institutions participation in the supply of insurance services in domestic markets (see Outreville, 2008). Swiss Re (2004) indicates that the market share of foreign insurers in parts of Eastern Europe exceeds 80 percent and that in Latin America to about 30-70 percent. The establishment and rapid growth of global Islamic insurance (Takaful) [10] industry in the Middle East, North Africa and South East Asia regions (see Swiss Re, 2008) as

[10] These institutions offer life insurance policies/products that are compatible with the teachings of Islam. The main difference between these policies/contracts and the conventional ones are that the Islamic life contracts are based on the principle of mutual assistance and voluntary contribution, interest-free based activities and the exclusion of excessive risk taking, as well as uncertainty in contracts, Swiss Re (2008).

well as increased integration of financial services and institutional innovations are also other developments.

Despite the overwhelming theoretical advance on the theory of the demand for insurance during the last 4 decades (for a survey of the literature see Loubergé, 2000), empirical work on insurance consumption across countries is limited in number but growing. Zietz (2003) provides a summary of published empirical studies both country specific and international studies on the determinants of the demand for life insurance. Zietz compares variables used, the findings of the studies, and tries to reconcile these studies. Hussels et al (2005) also provide a review of the studies on the determinants of the demand for insurance, and how insurance affects economic development. Although these reviews are helpful in understanding much of the previous work, they did not discuss the econometric methodologies used in these studies. Moreover, several studies have been carried out since Zietz (2003) and Hussels et al (2005) reviews. Below we provide an overview of existing empirical work on life and nonlife insurance consumption across countries. The focus is on highlighting the employed econometric methodologies.

1.7.1. International Empirical Work on Life Insurance: Overview

Table 1-1 provides a summary of international empirical work on the demand for life insurance. The table shows, sample size, dependent and independent variables used in each of the studies, and whether the variable was reported to be statistically significant at least at 10 percent level of significance.

Perhaps, Beenstock, Dickinson, and Khajuria (1986) and Wasow (1986) were the first to study life insurance consumption variations across countries. Wasow (1986) using a data set of 48 developing and developed countries and cross section regression, reported, among other things, life insurance premiums are positively related to per capita income, and population; and negatively related to gross domestic saving, inflation rate, and Islam being the dominant religion of a country. Although Wasow's (1986) study explained some aspects of international life insurance consumption variation, his focus was on how public policy and regulations affect the volume of insurance premiums. He did not address the impact of other factors such as the number of dependents and social security and welfare on the demand for life insurance consumption.

This was accomplished in a cross section regression study by Browne and Kim (1993). Using data of 44 developed and developing countries for the years 1980 and 1987, they reported that while young dependency ratio, income per capita, and social security and welfare have positive impacts; inflation rate, price of insurance and Islam being the dominant religion of a country have negative impacts on life insurance consumption. Although Browne and Kim (1993) brought to light the impact of the number of dependents on life insurance consumption variation across countries they did not investigate other factors such as the impact of the level of financial development and market structure on life insurance consumption.

This was addressed by Outreville (1996) in a cross section regression study using a dataset of 48 developing countries for the year 1986. He reported that while per capita income, life expectancy, and financial development have positive impacts; anticipated inflation and monopolistic structure of the market have negative impacts on the growth of life insurance market. Interestingly, Outreville (1996) reported that, among other things, the dependency ratio, and Islamic religion have no significant effect on the consumption of life insurance, which on the one hand, does not support the findings of Browne and Kim (1993), and indicates that the influence of life insurance demand factors may vary across countries at different stage of development, on the other. A weakness of the results of the cross section OLS regression studies is that they employ single year cross-sectional samples, which may be subjected to selection year biased.[11]

Notably, some of the findings of Browne and Kim (1993) are in line with Beenstock, Dickinson, and Khajuria (1986). Beenstock, Dickinson, and Khajuria (1986) study was confined to ten OECD countries.[12] Using pooled cross section and time series methods and data over 1970-1981, they reported that life insurance premiums vary directly with life expectancy, young dependency ratio, interest rates and income; and inversely with social security.

Li et al (2007) extended Beenstock, Dickinson, and Khajuria (1986) study to 25 OECD countries over the period 1993-2000 including more explanatory variables and using OLS and the General Method of Moments (GMM). In line with Beenstock, Dickinson, and Khajuria, (1986), Li et al (2007) found positive relationship between life insurance consumption and disposable income, and number of dependents; and negative relationship with social security and welfare. However, in contrast to Beenstock, Dickinson, and Khajuria (1986), they reported negative relationship between life insurance consumption and interest rates, and life expectancy. They also reported positive relationship between life insurance consumption and the level of education, as well as the level of financial development; and negative relationship between life insurance and inflation.

[11] Truett and Truett (1990) conducted a comparative life insurance consumption study between Mexico and the USA from a historical perspective, using data over 1960-1982 for the US, and 1964-1979 for Mexico and regression analysis. Hwang and Greenford (2005) investigated the determinants of the demand life insurance for China, Hong Kong, and Taiwan, using cross section and fixed effects methods over the period 1986-1999.
[12] The countries are the United States, West Germany, France, Japan, United Kingdom, Canada, Italy, Australia, Netherlands, and Sweden.

Although the studies provided some insight into the influence of demand factors on life insurance development, they did not address whether the influence of these factors may vary across countries at different stages of development. Moreover, with the exception of Wasow (1986), the studies also did not deal with possible impacts of institutional quality on life insurance development.

The study of Ward and Zurbruegg (2002) fills this gap in the literature by examining the importance of law and politics, among other things, for life insurance consumption using two samples of 16 Asia and 25 OECD countries over the period 1987-1998. They employed pooled cross section and the General Method of Moments (GMM) dynamic systems developed by Arellano and Bond (1991) and Arellano and Bover (1995). Ward and Zurbruegg (2002) reported OLS results of the two samples indicate that life insurance consumption is negatively related to inflation, and social security; and positively related to financial development, education, GDP per capita, and role of law. The GMM results of the two samples show that life insurance consumption is positively related to financial development, and GDP per capita; and negatively related to civil rights. Their findings also show that while life insurance consumption is negatively related to young dependency ratio in the Asia sample; it is positively related in the OECD sample. While education (risk aversion indicator) is positively related to life insurance consumption in the OECD sample, it is insignificant in the Asia sample. Life insurance consumption is negatively related to Islamic religion in the Asia sample. Ward and Zurbruegg (2002) results indicate that the influence of the determinants of life insurance consumption varies between countries at different stage of development, which is consistent with Enz (2000).

Enz (2000) using a logistic function and panel analysis for a dataset of 90 countries over 1970-98 suggests that the demand for life insurance varies as income per capita grows.

Although Enz (2000) study used a large sample of countries over a relatively long period, he did not investigate the influence of other factors than per capita income on life insurance premiums. Beck and Webb (2003) comprehensive study on the determinants of the demand for life insurance fills this gap in the empirical literature. They used cross section regression and panel data analysis for a dataset of 68 developing and developed countries, over the period 1961-2000. They found, on the one hand, positive influence of GDP per capita, old dependency ratio, banking sector development, institutional development, private saving, interest rates and permanent income on life insurance consumptions; and negative impact of inflation, Islam being the dominant religion in a country on life insurance consumption, on the other. They also argued that life insurance consumption is not robustly related to education, young dependency ratio, life expectancy, and social security.[13]

A weakness of the panel studies is that they employ panel data techniques that do not account for unobserved common factors.

[13] Our focus is on studies that are based on the standard theory of the demand for life insurance. There are a few other studies attempted to uncover the influence of culture on life insurance consumption. Park, Borde and Choi (2002) using a data set of 37 countries and cross section regression for the year 1997 investigated whether cultural differences, as measured by Hofstede's indexes (individualism, power distance, uncertainty avoidance, masculinity /femininity), may explain insurance consumption variations across countries. Chui and Kwok (2008) reinvestigated the role of cultural differences on life insurance consumption using a data set of 41 countries over the period 1976-2001, and pooled GLS regression and Hofstede’s cultural indexes. Park and Lemaire (2011) extended Chui and Kwok (2008) work by analyzing Hofstede's long-term orientation cultural dimension on the demand for life insurance using a data set of 27 countries over the period 2000-2008 and unbalanced GLS. Chui and Kwok (2009) provided more evidence on the importance of culture for life insurance consumption using House et al (2004) GLOB indexes, pooled GLS method over the period 1966-2004 across 38 countries.

1.7.2. International Empirical Work on General Insurance: Overview

Table 1-2 summarizes international empirical work on the demand for general insurance. The table shows, sample size, dependent and independent variables used in each of the studies, and whether the variable was found statistically significant at least at 10 percent level of significance.

Existing international empirical studies on general insurance may be traced back to Wasow (1986). Using cross section regression and a dataset of 48 developing and developed countries he found that general insurance premiums variation across countries can be explained by income per capita. Nevertheless, his focus was on the influence of public policy and regulations on general premiums development rather than the relationship between income per capita and the demand for general insurance.

Beenstock, Dickinson, and Khajuria (1988) analysed the relationship between income per capita and general insurance consumption. Using pooled annual cross-section data for 12 developed countries over 1970-1981 and cross-section regression for 45 developed and developing countries in 1981 found that general insurance consumption can be explained by per capita income and interest rates. However, they did not address the role of other factors on general insurance sector development.

Outreville (1990) investigated the role of financial development in the development of general insurance sector using cross-section data for the year 1983 of 55 developing countries. He found that general insurance consumption is positively related to GDP per capita, financial development, and negatively related to education.

A weakness of the cross section OLS regression results in these studies is that the results may be subjected to selection year biased and the sample of countries used is relatively small.

Both studies of Beenstock, Dickinson, and Khajuria (1988) and Outreville (1990) reported income elasticity greater than unity.

However, Enz (2000) using a logistic function, a dataset of 88 countries over the years 1970-98, and panel data analysis proposed the S-curve, which indicates that income elasticity varies as the economy grows. He reported that income elasticity of demand for insurance is equal to unity for specific low and high income levels and greater than unity for intermediate income levels. A limitation of the the S-curve is that it is a one factor model, i.e., GDP per capita, and neglects all other factors that influence the demand for general insurance. This was addressed by Browne, Chung, and Frees (2000) and Esho et al (2004) using different datasets and econometric techniques.

Browne, Chung, and Frees (2000) using a disaggregated data set of motor vehicle and general liability over the period 1987-1993 for the countries of the Organisation for Economic Cooperation and Development (OECD) and a panel multivariable fixed-effects model and a pooled cross-sectional model analysis, highlighted, among other things, the impact of the form of legal system, i.e., common law and statutory-law systems on the demand for insurance. They reported that the two lines of general insurance consumption (motor vehicle insurance consumption, and general liability consumption) are positively related to income and the form of legal system, and negatively related to wealth, and a country's insurance market share controlled by foreign firms. Browne, Chung, and Frees (2000) study paved the way for investigating the role of law on general insurance consumption, which was accomplished by Esho et al (2004).

Esho et al (2004) using a data set of 44 developed and developing countries over the period 1984-1998 extended the law approach applied to finance by Levine (1998, 1999) to general insurance consumption. They investigated the role of the origin of legal systems (English, French and German) and importance of enforcements of legal rights on the consumption of general insurance. They employed two-stage least-square (TSLS) cross section regression, fixed effects method, and the generalized methods of moments (GMM) dynamic system estimator developed by Arellano and Bond (1991) and Arellano and Bover (1995). They found positive and statistically significant relationship between general insurance consumption and GDP per capita, protection of property rights, and probability of loss. They also reported weak negative relationship between general insurance consumption and the price of insurance.

Nevertheless, the focus of Browne, Chung, and Frees's (2000) and Esho et al's (2004) studies was not on whether the demand for insurance increases or decreases with wealth. The issue was brought to light by Nakata and Sawada (2007).

They estimated a demand function for general insurance using partially linear regression model with a non-parametric component and data for the year 1994. While the non-parametric part includes income or wealth per capita, the parametric part includes other explanatory variables. In their model, the dependent variable is the ratio of aggregate premiums to the initial wealth. They reported wealth elasticity greater than unity for low wealth countries and less than unity for upper-middle and high wealth countries. They also reported income elasticity of insurance greater than unity, and argued that since the theory of insurance as presented by Arrow (1965) and Pratt (1964) states/predicts that the demand for insurance depends on its price and the initial wealth (rather than income) then the relationship between income and insurance demand is spurious. Surprisingly, they did not report any statistical test to support their assertion.[14]

A weakness of these studies is that they use either relatively small, (an exception is Enz 2000) samples or panel data techniques that do not account for unobserved common factors.

1.7.3. Further Evaluation of the Empirical Work

The brief summary of existing international empirical literature on life and general insurance indicates that the long run economic relationship between insurance consumption and its determinants across countries has not been investigated in the empirical literature.[15] These would include whether insurance consumption and its determinants cointegrate or not.

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[14] Our focus is on empirical studies that apply the standard theory of the demand for nonlife insurance. Two other studies focus on the role of culture on nonlife insurance development. Park, Bored, and Choy (2002), using a dataset of 37 countries for the year 1997 and OLS regression analysis investigated the impact of socio-cultural variables on the degree of insurance pervasiveness using Hofstadter's cultural dimensions, namely uncertainty avoidance, power distance, individualism/collectivism, and masculine/feminine. Park, and Lemaire (2011) study the impact of culture on nonlife insurance demand using unbalanced GLS regression, Hofstede's cultural dimension variables and a data set of 82 countries over the period 1999-2008.

[15] Notably some recent country specific studies conduct, among other things, co-integration tests. These studies include Lim and Haberman (2004), Lenten, and Rulli, (2006) and Sen (2008). Lim and Haberman (2004) studied time series properties for the determinants of life insurance in Malaysia, and report the presence of cointegration between the demand for life insurance and macroeconomic variables. Likewise, Sen (2008) reports the presence of cointegration between the demand for life insurance and its determinants in India. A notable work is that of Lenten, and Rulli (2006).They investigated the long run relationship between the demand for life insurance and its determinants in Australia. Employing seemingly unrelated time series equations (SUTSE) model they report evidence for cointegration relationship between the demand for life insurance and most of its determinants- the price level, income, unemployment and population but interest rate-in their model.

Note also that, there are a few related studies that investigate the role of insurance in economic growth. These are Ward and Zurbruegg (2000), Kugler and Ofoghi (2005), Webb, Grace and Skipper (2005), Arena (2006), Haiss and Sümegi (2008), Adams et al (2006) and Han et al (2010). The focus of the studies is the link between insurance and economic growth using aggregated insurance premiums data (i.e., both life and nonlife or separate).

Therefore, a study in this regard would enhance our understanding of whether the relationship between the two is spurious or not. Such a study may also highlight the factors that policy makers can take advantage of to stimulate insurance consumption and the development of a viable insurance sector in emerging and developing markets.

Moreover, the empirical literature, on formal insurance, sounds to follow the traditional view approach in financial economics that focuses on formal insurance and neglects informal risk sharing institutions. Any interaction between formal and informal risk shifting institutions either is neglected or considered to be of little importance. This tendency stems, perhaps, from Arrow's definition to insurance as "*an exchange of money now for money payable contingent on the occurrence of certain events*", Arrow (1971, p.134). This definition is in line with the reserves principle that governs operations of insurance companies. Although, Arrow (1971, 1996) indicated that the essence of insurance is risk shifting, he dealt only with market institution of insurance and emphasized its "importance in the economies of advanced nations", Arrow (1971, p.134). In other words, he did not deal with non market risk sharing institutions that are used in less advanced economies.

Nevertheless, formal and informal financial institutions coexist in the developing world. Informal financial institutions include extended family/ relatives, friends, rotating savings and credit associations, money lenders, and funeral societies. These types of informal institutions are widely used in rural and urban areas in developing countries, to finance, for instance, emergency requirements and mitigate income risk. Although it is difficult to quantify the extent and size of informal risk sharing institutions there is extensive literature that shows evidence of their prevalence

(Posner, 1980, World Bank, 1989, Besley, 1995, Morduch, 1999, Mauri, 2000, Zhang, 2008).

Therefore, a study that incorporates informal financial institutions as a possible determinant for formal insurance consumption would fill the gap in existing empirical literature and enhance our understanding of the relationship between formal and informal insurance institutions.

Furthermore, existing empirical literature on the demand for life insurance focuses on more general factors, and less on the fundamental factors- from the theoretical point of view- that derive the demand for life insurance. That is, existing work has paid little attention to the impacts of types of bequest motives that derive parents to purchase life insurance coverage, and the role of private credit consumption, on life insurance consumption variation across countries.

Therefore, a study of these aspects would enlighten both theorists and applied economists alike and enrich our understanding about the sources of life insurance consumption variation across countries.

Moreover, there are econometrics issues that arise in the estimation of the demand for insurance models with cross section or panel data that need to be addressed in light of recent advancement in econometrics. The empirical cross country studies aim at quantifying structural or causal relationship between the demand for insurance and its determinants, and test theories by regression model. A typical econometrics equation of the demand for insurance may take the following form:

$$q_{it} = \alpha_i + \beta_i' x_{it} + e_{it}, \qquad \begin{array}{l} \mathrm{i} = 1, \ldots\ldots, \mathrm{N}, \\ \mathrm{t} = 1, \ldots\ldots, \mathrm{T}, \end{array} \tag{1.5}$$

where q is the dependent variable (often insurance density or insurance penetration), β and x are vectors of coefficients and explanatory variables respectively, and α_i is the unobserved effect/ a country specific effect. While panel data involves N cross section and T time series, a cross section data only involves T=1.

A common assumption in linear regression is that the mean of the error term conditional on the independent variables for all observations is zero. That is: $E(e_i \mid x_{i1},....,x_{iN}) = 0$. This assumption of strict exogeneity implies that both no contemporaneous correlations between the independent variables and the error term as well as zero unconditional mean of the error term, Hsiao (2003, ch.1). Other assumptions of the linear regression model include neither multicollinearity; nor heterskedasticity or autocorrelation.[16] Under these assumptions Ordinary Least Squares (OLS) estimates are consistent.

However, there are many reasons why the strict exogeneity assumption may not hold. Murray (2006) indicates that correlation of an explanatory variable with the error term can arise due to endogeneity, missmeasurement, omission of an explanatory variable, or inclusion of a lagged dependent variable as an explanatory variable.

An explanatory variable may be omitted due to lack of data or because it may be unobservable. Any omitted variable becomes part of the error term, which can result in biased estimate. Sykes (1992, pp.25-26) indicates that exclusion of an explanatory variable that can affect the dependent variable creates an omitted variable bias; which is a function of the true coefficients of the excluded variable, and the correlation between the included and excluded variable.

Missmeasurement of one or more explanatory variables can result in attenuation bias if the measurement error is correlated with the measured explanatory variable, (Beck, 2009, p.1184). Again such errors become part of the error term, which leads

[16] For a mathematical derivation of the classical regression model assumptions see Hsiao (2003, ch.1).

to a bias in the estimated coefficients of the regression equation, Sykes (1992, pp.27-28). The problem of measurement error is likely to prevail, in particular, in data related to developing countries (Durlauf, Johnson, and Temple, 2009, p.1160). While, for instance, in a bi-variate model the consequence of measurement error in the independent variable is that the coefficient will be biased towards zero, in a multivariate model, a measurement error in only a variable, results in all parameters become biased, some of which away from zero, (ibid, see also Beck, 2009). In the presence of miss-measured or omitted variable OLS generally yield inconsistent estimate. This problem can be solved by finding a suitable proxy for the omitted variable, or assuming that the omitted variable is time invariant and use the fixed effects method, (Wooldridge, 2009).

The basic assumption of the fixed effects model is that conditional on observed explanatory variables the effects of all omitted or excluded variables is driven by individual time invariant variable that are specific to individual cross sectional unit, (Hsiao, 2003, p.27). Therefore, the fixed effects estimator eliminates any time-invariant omitted variable bias and time-invariant measurement bias (Beck, 2009, p1184).

However, the fixed effects estimator requires that each explanatory variable changes over time, and strict exogeneity, i.e., $E(e_{it} | x_i \alpha_i) = 0$; $Var(e_{it} | x_i, \alpha_i) = Var(e_{it}) = \sigma_e^2$, for all $t = 1, \ldots, T$.; and $\mathrm{Cov}(e_{it}, e_{is} | x_i, \alpha_i) = 0$, for all $t \neq s$, Wooldridge (2009, 503-4). Monte Carlo simulations (Nerlove, 1967, Maddala, 1971) have shown that using the fixed effects estimator for dynamic models is inconsistent as $N \to \infty$ for fixed T. Nickell (1981) provides a formal analysis of the biases for the case of first-order autoregressive models estimated by OLS using panel data and including individual fixed effects.

The problem of omitted variable can also be solved through the use of two stage least squares / the instrumental method (IV). The approach does not assume constant variable, hence allowing for a broader set of omitted variable (Wooldridge, 2009, p.506). Nevertheless, the instrumental method (IV) requires a valid exogenous instrument. For an instrument to be valid it must not be (1) correlated with the error term, (2) be correlated with the explanatory variable in question and (3) not included as an explanatory variable in the original equation, Murray (2006). If an instrument is correlated with the error term the instrument is invalid as it can yield more biased estimate coefficient than the corresponding OLS estimate, Murray (2006, p.114).

The instrument may also be weak, i.e., weakly correlated with the explanatory variable in question. This makes the instrumental method (IV)/ two-stage least squares estimates biased and two-stage least squares' estimated standard errors far too small, Murray (2006, p.122).

If the instrument is weak or unavailable one could use difference GMM estimator proposed by Holtz-Eakin, Whitney, and Rosen, (1988) and Arellano-Bond (1991). The Arellano and Bond (1991) difference GMM estimator is obtained after first differencing all explanatory variables. The approach utilises lagged levels of endogenous variables as instruments.

As Monte Carlo simulations have shown that difference GMM estimator suffers from large finite sample bias and poor precision, and lagged levels are weak instruments for first differenced regressors, Blundell and Bond (1998, pp.115-116) propose a linear system GMM estimator of first differenced and levels equations. Their approach uses lagged differences of the dependent variable as instruments for equations in levels, and lagged levels of the dependent variable as instruments for equations in first differences. Using simulations Blundell and Bond (1998) report, that, the use of system GMM increase efficiency and outperform the difference GMM estimator.

Unlike the fixed effects model, the GMM approach can be used when explanatory variables include a lagged dependent variable. Beck, (2009,p.1185) indicates that researchers have utilised dynamic panel regressions using lagged values of the explanatory endogenous variables as instruments to overcome biases related to the inclusion of the lagged dependent variable and omitted variable bias. Moreover, Wooldridge (2001, p.98) points out that the GMM estimator can be used to obtain consistent parameter estimate under weak distributional assumptions in panel data. Although the GMM can have poor small sample properties, it makes use of the orthogonality conditions to allow for efficient estimation in the presence of heterskedasticity compared to the traditional IV method, which is inefficient in the presence of unknown form of heterskedasticity, Baum, Schaffer and Stillman (2003). Notably, the use of the method of instrumental variables, and difference and system generalised method of moments presumes availability of valid instruments.

However, Swamy, Tavlas and Hall (2009) show that the nonexistence, in general, of instruments (weak or strong). Their argument applies to external instrumental variables (IV methods) as well as lagged values of variables in a model (GMM methods).

Moreover, in the presence of cross section dependence the standard panel estimators are inefficient and estimated standard errors are biased and inconsistent, (Andrews, 2003; Phillips and Sul, 2003). Granger and Newbold (1974, p.111) indicate that autocorrelated errors in regression analysis leads to (i) inefficient estimates of the regression coefficients, (ii), sub-optimal regression based forecasting; and (iii) invalidate significance tests on the coefficients.

Phillips and Sul (2003) have shown that if there is cross section dependence in the data and ignored, the pooled (panel) ordinary least squares estimators provides little gain in precision over the single equation OLS. They also show that in dynamic panel models unobserved common factors create small sample bias, and variability in the inconsistency of the fixed effects estimator as $N \to \infty$, for fixed T.

Sarafidis and Robertson (2008) show that in the presence of cross section dependence in the errors, all estimation procedures for dynamic panel-data models with $T < N$ (i.e., $N \to \infty$, for fixed T) that rely on IV and the generalized method of moments (GMM) advanced by Anderson and Hsiao (1981), Arellano and Bond (1991), and Blundell and Bond (1998) are inconsistent, as the moment conditions used are invalid. They argue that, this is true in the presence of cross section dependence in the error for any lag length of lagged values of the dependent variable in levels or in first difference used as instrument.

Cross section dependence in the error may arise due to omitted common factors or spatial spill-over variables. Neighbouring countries or countries with close economic ties may experience common shocks. Andrews (2003) discuses the effects of common shocks, such as macroeconomic, political, and environmental shocks on the properties of least squares and IV estimators in cross-section regressions. He argues that common shocks are a likely feature of cross section economic data on individuals, households, firms or some other units. He indicates that macroeconomic shocks, such as, inflation, interest rates, stock market, oil price shocks, financial crises, national fiscal and monetary policy, international integration, and real shocks affect individual's wealth and firm assets as well as the behaviour of individuals, households and firms regarding consumption, production and investment. Other shocks cited by Andrews (2003) include legal/institutional shocks including regulatory changes; political shocks including changes in political regimes, changes in policy of existing regimes, war; environmental shocks whether it is manmade or natural disasters, health shocks, and sociological shocks. Spatial dependence may attribute to location and distance dependence. In economic geography Tobler (1970, p.236) invoked his "first law of geography" that "everything is related to everything else, but near things are more related than distant things."

Cross section dependence in the errors can be modelled using the factor structure approach and /or the spatial econometrics approach (Sarafids and Wansbeek, 2010, p.4; Pesaran and Tosetti, 2011, p.181). In the spatial approach the structure of cross section correlation depends on a distance measure, such as economic distance (Conely, 1999) policy and social distance (Conley and Topa, 2002). Cross sectional dependence is incorporated into the model by means of a spatial process that relates each unit to its neighbour, Whittle (1954). In estimating panel data models with spatial correlation a generalised method of moments (GMM) (Lee, 2007; Kelejian and Prucha, 2010), or a maximum likelihood method are used (Lee, 2004)

The factor structure approach assumes that cross section dependence can be characterised by the presence of unobserved common factors attributable to macro shocks that affect all cross section units with different intensities, (Pesaran and Tosetti, 2011, p.181).

In the case of panel with $N < T$ typically $N < 10$ and the errors across different equations are correlated, the standard approach is to treat the equations as a system of seemingly unrelated regression equations (SURE) and employ the generalised least squares (GLS) (Zellner, 1962, Baltagi and Pirotte, 2011, Pesaran, p.967, 2006). However, when $N > T$ the SUR method is not feasible, Sarafids and Wansbeek, 2010, p.9). When T is fixed and $N \to \infty$, and when $(N,T) \to \infty$, jointly, Pesaran

(2006) suggests the common correlated effects Pooled (CCEP) estimator. Pesaran (2006) indicates that the basic idea behind the CCEP estimator is to augment the regression equation by the cross section averages of the dependent and explanatory variables (such that as $N \to \infty$) to eliminate the differential effects of unobserved common factors.[17] Below we provide a short description of the CCEP advanced by Pesaran (2006). The presentation of CCE method is based on Pesaran (2006) and Pesaran and Tosetti (2011). Consider a panel data model of the type of equation (1.5):

$$q_{it} = \alpha_i' d_t + \beta_i' x_{it} + e_{it} \tag{1.6}$$

where d_t is an n x 1 vector of observed common effects. Pesaran (2006), and Pesaran and Tosetti (2011) consider the factor structure and the spatial approach of cross section dependence. In the case of unobserved common factors Pesaran (2006) assumes that the errors can have the multifactor structure:

$$e_{it} = \gamma_i' f_t + \varepsilon_{it} \tag{1.7}$$

where f_t is the m x 1 vector of unobserved common effects allowed to be correlated with (d_t, x_{it}), and ε_{it} are the errors assumed to be independently distributed of (d_t, x_{it}). By contrast, Pesaran and Tosetti (2011) suggest that spatial error cross section dependence can take the following general form:

$$e_{.t} = R_t \varepsilon_{.t} \quad \text{for } t = 1,2,\ldots,T, \tag{1.8}$$

where $e_{.t} = (e_{1t},\ldots,e_{Nt})'$, $\varepsilon_{.t} = (\varepsilon_{it},\ldots,\varepsilon_{Nt})'$ and R_t is a given N x N matrix and has bounded row and column norms for all t. Pesaran (2006) incorporates possible correlation between explanatory variables and the common factors by assuming

$$x_{it} = A_i' d_t + \Gamma_i' f_t + \mathrm{v}_{it}, \tag{1.9}$$

[17] A principal component approach also was suggested by Coakley, Fuertes, and Smith, (2002), and by Kapetanios and Pesaran (2007). However, it has been indicated the approach can yield inconsistent estimates (See Sarafids and Wansbeek, 2010, pp.9-10 and references therein).

where A_i and Γ_i are *n x k* and m x k, factor loading matrices with fixed components, and v_{it} are the specific components of x_{it} distributed independently of the common effects and across i, and covariance stationary. Combining (1.6)-(1.8) Pesaran (2006) obtains the following system of equations:

$$z_{it} = \begin{pmatrix} q_{it} \\ x_{it} \end{pmatrix} = B_i' d_t + C_i' f_t + u_{it} \tag{1.10}$$

where $u_{it} = \begin{pmatrix} \varepsilon_{it} + \beta_i' v_{it} \\ v_{it} \end{pmatrix}$, $B_i = (\alpha_i \quad A_i)\begin{pmatrix} 1 & 0 \\ \beta_i & I_k \end{pmatrix}$, $\mathrm{C_i} = (\gamma_i \quad \Gamma_i)\begin{pmatrix} 1 & 0 \\ \beta_i & I_k \end{pmatrix}$,

I_k is an identity matrix of order k, and the rank of C_i is determined by the rank of the m x (k x+1) of the matrix of the unobserved factor loadings $\tilde{\Gamma}_i = (\gamma_i \quad \Gamma_i)$, For the estimation and inferences of $E(\beta_i) = \beta$ Pesaran (2006) utilises the cross section averages of the equation (1.10) using the weights w_i

$$\bar{z}_{wt} = \bar{B}_w' d_t + \bar{C}_w' f_t + \bar{u}_{wt} \tag{1.11}$$

where $\bar{z}_{wt} = \sum_{j=1}^{N} w_j z_{jt}$, $\bar{B}_w = \sum_{i=1}^{N} w_i B_i$, $\bar{C}_w = \sum_{i=1}^{N} w_i C_i$, $\bar{u}_{wt} = \sum_{i=1}^{N} w_i u_{it},$

Assuming that Rank of $(\bar{C}_w) = m \leq k+1$ for all N then equation (1.11) can be written as follows: $f_t = (\bar{C}_w \bar{C}_w')^{-1} \bar{C}_w (\bar{z}_{wt} - \bar{B}_w' d_t - \bar{u}_{wt})$. Noting that $\bar{u}_{wt} \xrightarrow{q.m.} 0$ as $N \to \infty$, for each t, and assuming Rank $(\tilde{\Gamma}) = m$, Pesaran (2006) obtains $f_t - (CC')^{-1} C(\bar{z}_{wt} - \bar{B}_w' d_t) \xrightarrow{p} 0$, as $N \to \infty$.Therefore, he suggests that the cross section averages $\bar{h}_t = (d_t', \bar{z}_{wt}')'$ can be used to approximate f_t; the weights w_i are not unique and when N is relatively large, one can use the equal weights w_i = 1/N, or measures of economic distance. Hence, Pesaran (2006) indicates that the slope coefficients of interest β can be consistently estimated by augmenting the pooled regressions of q_{it} on x_{it} with d_t and the cross-section averages $\bar{z}_{wt}$ of the dependent variable $\bar{q}_{.t} = N^{-1}\sum_{i=1}^{N} q_{it}$ and explanatory variables $\bar{x}_{.t} = N^{-1}\sum_{i=1}^{N} x_{it}$. That is:

$$q_{it} = \alpha_i' d_t + \beta_i' x_{it} + g_i' \bar{h}_t + \varepsilon_{it} \tag{1.12}$$

where g_i' is vector of factor loading and the Common Correlated Effects Pooled estimator is given by:

$$\hat{B}_{CCEP} = \left(\sum_{i=1}^{N} x_i' \bar{M} x_i \right)^{-1} \sum_{i=1}^{N} x_i' \bar{M} q_i \tag{1.13}$$

where x_i and q_i are defined as above, and $\bar{M}_w = I_T - \bar{H}_w(\bar{H}_w'\bar{H}_w)^{-1}\bar{H}_w'$, where $\bar{H}_w = (D, \bar{Z}_w)$, are T x n data matrix on observed factors, and D and $\bar{Z}$ are the matrices of observations on d_t and cross-section averages, i.e., $\bar{Z}_{.t} = (\bar{q}_{.t}, \bar{x}_{.t}')'$ respectively. Pesaran (2006) notes that the CCE Pooled estimator gains efficiency from pooling observation.[18] Pesaran (2006) and Pesaran and Tosetti (2011) using simulations have shown that the estimators perform well in small samples as small as N=20 and T=10. Pesaran (2006) argues that the estimator yields consistent estimate in the presence of correlated unobserved common effects both when T is fixed and $N \to \infty$, as well as when $(N,T) \to \infty$, jointly, and that the CCE method is robust to the choice of the number of common factors.

The discussion so far has been confined on stationary cross section and panel data. Kao and Chiang (2000) show that "*ordinary least squares (OLS), fully modified OLS (FMOLS), and dynamic OLS (DOLS) estimators in cointegrated regression models in panel data...are all asymptotically normally distributed... and .. that (1) the OLS estimator has a non-negligible bias in finite samples, (2) the FMOLS estimator does*

[18] He also proposes the following estimator for the mean of the slope coefficients , the CCE mean group estimator is, a simple overage of the individual CCE estimator $\hat{B}_{CCEMG} = N^{-1}\sum_{i=1}^{N}\hat{\beta}_{CCE,i}$ where $\hat{B}_{CCE,i} = (x'\bar{M}x_i)^{-1}\, x_i'\bar{M}q_i$

not improve over the OLS estimator in general, and (3) the DOLS estimator outperforms both the OLS and FMOLS estimators."p.179. According to the authors, the "FMOLS is constructed by making corrections for endogeneity and serial correlation to the OLS estimator", and the DOLS estimator uses the past and future values of the first difference of the regressors as additional explanatory variables. Their analysis assumes that T goes to infinity followed by N goes to infinity, i.e., T>N. The DOLS estimator also ignores cross section dependence in estimation.

Phillips and Moon (1999) and Pedroni (2000) investigated the fully modified OLS estimator for panel under the assumption of cross section independence. Phillips and Moon (1999) approach requires that $N/T \to 0$, which implies that the theory applies for moderate N and large T macro panel data and not large N and small T, (see Baltagi and Kao 2000). All these cointegrated estimators are formulated for cross sectionally independent panel. To accommodate cross section dependence in a panel data Moon and Perron (2005), and Mark, Ogaki and Sul (2005) proposed Dynamic Seemingly Unrelated Cointegrating Regression (DSUR). The authors argue that the DSUR estimator is efficient when the errors are correlated across equations. However, the DSUR is applicable for balanced panel data with T>N. In the same vein, Phillips and Sul (2003) developed a panel approach to median unbiased estimation. Their approach includes a panel feasible generalized median unbiased (PFGMU) estimator, and the seemingly unrelated panel median-unbiased (SUR-MU) estimator. Their approach is applicable for large T. For instance, Phillips and Sul in their simulations consider panels where N =1 or at most 30 and T =50 or at most 200. They also do not provide asymptotic results in case of large N.

Kapetanios, Pesaran and Yamagata (2011) extend the work of Pesaran (2006) to the case where the unobserved common factors are allowed to follow unit root processes. They show that the main results of Pesaran (2006) continue to hold even in this case and the Common Correlated Effects (CCE) estimators can be used regardless of the order of integration of the data observed.

Since a long run relationship study involves panel unit test and cointegration test, it is worthy to indicate the tests to be used in this study. A choice between existing tests often occurs in light of the data under investigation is balanced /unbalanced, cross sectionally independent or dependent, the asymptotic of cross section dimension N and time dimension T of the data.[19] The data sets to be employed in this study are unbalanced panel in which the cross sections dimension exceeds the time dimension. Existing panel unit root tests may be classified into first generation panel unit root tests which assume cross section independence, and second generation that takes into account cross section dependence in the data. Recent surveys are in Breitung and Pesaran (2008) and Hurlin and Mignon (2006).

While first generation panel unit root tests include; Levin, Lin and Chu 2002); Im, Pesaran and Shin (1995, 2003); Maddala and Wu (1999), Hadri (2000); Breitung (2000); and Harris and Tzavalis (1999), second generation panel unit root tests include the contributions of Bai and Ng (2004), Moon and Perron (2004), Choi (2002) and Pesaran (2007) among others.

While Levin, Lin and Chu 2002) and Breitung (2000) assume a common unit root process, Im, Pesaran and Shin (1995, 2003); and Maddala and Wu (1999)-Fisher type Augmented Dickey-Fulle (ADF) and Phillips-Perron (PP) allow for individual unit root process. While Levin, Lin and Chu 2002) study balanced panels, Im, Pesaran and Shin (1995, 2003) allow for unbalanced panels. The Levin, Lin and Chu 2002); Im, Pesaran and Shin (1995, 2003) tests require small N relative to T, i.e., $N<T$. Baltagi

[19] Availability of computational programme is also another issue. For instance we were unable to obtain computational programme codes for Bai and Ng (2004), Moon and Perron (2004), and Choi (2002).

(2005, p.243) indicates that "both tests may not keep nominal size well when either N is small or N is large relative to T". By contrast, The Harris-Tzavalis (1999) test requires balanced data and differs from Levin, Lin and Chu (2002) test in that it assumes fixed T. Hadri (2000) indicates that his tests are appropriate for panel datasets in which T is large and N is moderate. Maddala and Wu (1999) Fisher type test does not require balanced data, and the data can have gaps. The test assumes that T tends to infinity and N, may be fixed or tend to infinity. Maddala and Wu (1999) find the Fisher test is superior to Im, Pesaran and Shin (1995, 2003) test, which also is superior to Levin, Lin and Chu (2002) test.

Although the statistical testing procedures of Bai and Ng (2004), Moon and Perron (2004) and Pesaran (2007) approaches differ, they assume that an unobserved common factor structure explain cross section dependence, (Hurlin and Mignon, 2006). However, unlike Bai and Ng (2004), and Moon and Perron (2004) tests that require balanced data, Hurlin and Mignon (2006), Pesaran (2007) test allows for unbalanced panel data. The test by Moon and Perron (2004) is asymptotically valid only when $N/T \to 0$ as both N and $T \to \infty$ which means a data set where T is larger than N, which does not apply to our data set whereas N exceeds T. By the same token, the stationarity test developed by Harris, Leybourne and McCabe (2005) is designed for panel data set with small cross section dimension and large time span dimension. They derived the asymptotic of the test assuming fixed N and passing T the time dimension to infinity. They indicate that if the panel dimension is not relatively small, individual sample errors can significantly affect the finite sample distribution of the test statistic. As the data sets used in this study are unbalanced whereas N exceeds T we use Pesaran (2007) and Maddala and Wu (1999) Fisher type

Phillips-Perron (PP) panel unit root test. As diagnostic tests suggest the presence of cross section dependence, the latter test is used for comparison.

Regarding cointegration test Engle and Granger (1987) suggest that if there is cointegration between variables the residuals should be stationary. They argue that cointegration among variables can be interpreted as a long-run equilibrium relationship among the variables. Milgate (2008, p.1) indicates that equilibrium "can be taken to signify a point from which there is no endogenous 'tendency to change': stationary or steady states exhibit this kind of property." Pesaran (1997) suggests that empirical application of the theory of unit root and cointegration of long-run relations should be based on the steady state solutions of intertemporal optimisation problems from economic theory, providing that that the steady state solution exists, is stable and unique. Following Pesaran, (1997) in our analysis such a long run equilibrium/steady state solution is obtained by considering an optimisation problem faced by a representative insurance consumer, and the long-run coefficients is given by the cointegrating vector. In a bi-variate equation the cointegrating vector is unique; however, if there are more than two variables, the cointegrating vector is generally not unique (Maddala and Kim, 2004, p.40; and Pedroni, 1999, p. 655).

Early work on panel cointegration tests were developed as an extension to Engle and Granger (1987) approach based on the residual, e.g., Kao (1999) and Pedroni (1999, 2004). These tests involve investigating whether the residuals of the cointegrating regression are nonstationary. While the Kao test assumes homogeneous coefficients; the Pedroni test allows for heterogeneity among cross-section units. Both tests assume cross-sectional independence among panel units, although Pedroni (1999, 2004) allows for a common time effect.

Generally, in the presence of cross section dependence, Wagner and Hlouskova (2009) note that "*the panel cointegration literature appears to be relatively nascent and partly ad-hoc with regard to cross-sectional dependence and in particular there does not seem to exist a consensus yet about successful modelling strategies for cross-sectional dependence.*",p.2.

A possibility is, to address the presence of cross section dependence in the data sets as Pedroni (1999) suggested, and employ cointegration tests that require cross section independence. Pedroni (1999), among others, suggests that demeaning removes cross section dependence in the data. The procedure involves subtracting cross section averages from the observations before currying out the test. If countries are subjected to common factors then demeaning the data eliminates cross section dependence in the data, Arpaia and Turrini(2008, p.12). To account for country specific deterministic trends Phillips and Moon (2000) suggest applying the test on OLS de-trended data. They indicate that OLS de-trended allows a consistent estimate of the cointegrating vectors. Arpaia and Turrini (2008) employed the procedure in their study on the long run relation between government expenditure and economic growth in the EU. They indicate that when the effects of the common factors vary across countries, demeaning does not mitigate cross-sectional dependence in the data. In this case, one may consider the CCE approach. It can be applied to data with large cross sections relative to the time dimension and allow for the possibility that the unobserved common factors are heterogeneous and correlated with the regressors. Holly, Pesaran and Yamagata (2010) suggest a two-step procedure to test for cointegration. In the first step use the CCEP estimator to estimate the residuals and then apply panel unit tests to these residuals. Banerjee and Carrion-i-Silvestre (2011) provide a formal analysis to the ideas of Holly, Pesaran and Yamagata (2010) for integration test within the CCE framework. They show that the CCEP estimator "*provides a consistent estimation of the long-run parameter, which captures a statistical relationship among non-individually cointegrated variables. This can be used as basis for a panel cointegration test*.", p.2. They describe the test procedure using Monte Carlo simulations and provide critical values in their paper. According to the authors, the procedure for cointegration test is to use the CCEP estimated coefficients to define the variable $\tilde{q}_{it} = q_{it} - x'_{it}\hat{\beta}_{CCEP}$,for which OLS is used to estimate $\tilde{q}_{it} = \alpha_i + e_{it}$ and investigate the order of integration of the residuals computed as $\hat{e}_{it} = \tilde{q}_{it} - \hat{\alpha}_i$. They suggest that the null hypothesis of no cointegration can be assessed by testing the stationarity of $\hat{e}_{it}$ applying the cross section averages augmented ADF cointegration (CADFC) statistic:

$$CADFC_P = N^{-1}\sum_{i=1}^{N} t_{\hat{\alpha}_i,0} \tag{1.14}$$

where $t_{\hat{\alpha}_i,0}$ denotes the t-ratio of the estimated $\alpha_{i,0}$ parameter in the following regression:

$$\Delta\hat{e}_{i,t} = \alpha_{i,0}\hat{e}_{i,t-1} + \sum_{j=1}^{p}\alpha_{i,j}\Delta\hat{e}_{i,t-j} + \xi_t\bar{\hat{e}}_{t-1} + \sum_{j=0}^{p}\eta_{i,j}\Delta\bar{\hat{e}}_{t-j} + w_{i,t} \tag{1.15}$$

Other recent panel cointegration test contributions that accommodate for cross section dependence among panel units are applicable when the cross dimension N is small relative to the time dimension T of the data. These tests include the contribution of Groen and Kleibergen (2003); Nelson, Ogaki and Sul (2005), and Westerlund (2008).

In studying the long run relationship between life insurance consumption and its determinants we use unbalanced data sets that extend to a period of about 40 years covering different regions and countries at different levels of development and economic structures.[20] However, the span of the data varies for different countries.

[20] Memedovic and Iapadre (2010) provides a quantitative analysis of sectoral trends and evolution of agriculture, industry and services in terms of their share of world value added for six continental

For most transitional countries the data is available from late 1980s and early 1990s. By the same token, for many developing countries the data is available from the 1980s. However, for most developed and some developing countries the data covers the entire period. We use the unbalanced data, because of its availability and that extracting a balanced panel out of an unbalanced panel data leads to an enormous loss in efficiency as shown by Monte Carlo simulations (Mayer, 2010; see also Baltagi, 2005, ch.9). Moreover, for investigating time series properties of a data set, a long time span is desirable. Hakkio and Rush (1999) argue that "cointegration is a long-run property and thus we often need long spans of data to properly test it "(p.579) and the use of long span is therefore desirable. Zhou (2001) using Monte Carlo simulations shows that the ability of cointegration test to detect cointegration depends more on the time span than on the mere number of observation. By the same token, Campbell and Perron (1991, p.153) noted that the power of unit root tests depend on the span of the data. They argue that, for a given data set (number of observation), the power of the test is largest when the span is longest, and therefore, tests of unit roots tests should be performed using data over a long period of time. Similarly, Shiller and Perron (1985) show that, the power of unit root test depends on the spans of time of the dataset rather than on the number of observations.

Although using a long period data set is desirable in terms of power properties, one need to be careful about interpreting the results as noted by Campbell and Perron (1991,p.153). They indicate that using a long sample increases the likelihood that the data is influenced by a major structural change, which would bias the test in favour of the unit root hypothesis.

regions (are Africa, Asia, Europe, Latin America, and the Caribbean, North America, and Oceania) and a detailed analysis of the sector structure of manufacturing value added in a sample of 30 developing and developed countries during the period 1970-2008.

Although we acknowledge that many countries experienced change in financial regulations, e.g. in the 1990s, to test the stability of the long relationship during the period of the study does not appear to be feasible given the datasets are unbalanced and most countries have different spans of time, i.e., the number of observations over time varies across countries in the dataset

1.8. Contributions of the Study

This thesis contributes to the literature on insurance economics in several ways. It investigates the long run economic relationship between the demand for insurance services and its determinants.

Firstly, the long run economic relationship between general insurance and income per capita has not being investigated in the empirical literature. Such an investigation is desirable in light of the view expressed by some authors (see Nakata and Sawada, 2007) that the relationship between the demand for general insurance and per capita income is spurious, without any statistical test to support their assertion. With increased losses due to natural disasters and the associated uninsured losses worldwide, and in particular in developing countries, the low level of general insurance consumption in the developing world is often explained by citing insurance is a luxury item (see Galabova, and Lester, 2001). That is, income elasticity with respect to general insurance is greater than unity. However, estimation results of existing international empirical studies, often referred to, in this regard, have used simple cross section OLS regression and/or relatively small sample of countries. Therefore, a study of the relationship between the demand for general insurance services and per capita income, using standard panel technique and recent data is highly relevant and enlightens both researchers in the subject and policy makers alike. Chapter two of the thesis attempts to fill this gap in the empirical literature. We employ standard panel data analysis using unbalanced data set of 99 industrialized and developing economies over the period 1987-2009.

Secondly, it is believed that the demand for mortality risk coverage/life insurance is driven by the bequest motive and/or the collateral motive. However, existing international empirical work do not treat separately consumer's demand for mortality coverage due to bequest motives from that motivated by credit motives. Moreover, existing empirical work does not investigate the impacts of different types of bequest motives on the demand for life insurance.

The importance of investigating different types of bequest motives arises in light of the empirical finding by Beck and Webb (2003) that there is no robust relationship between life insurance consumption and young dependency ratio (proxy for average dependents). In contrast, Browne and Kim (1993), using cross section regression reported that young dependency ratio is positively related to life insurance consumption. The two studies applied Lewis's (1989) framework that implicitly suggests that altruism motivates bequest (life insurance coverage). However, types of bequest motives may vary across countries (societies) at different stages of development. Altruistic bequest motive (see Becker and Lewis, 1973; Becker 1981; De Tray, 1973) may be applicable in the context of developed countries but not necessarily in the developing world. In contrast, a bequest as exchange motive (see Pestieau, 2000; and Razin and Sadka, 1995) has been suggested in the context of developing countries.

The two bequest motives have different implications for fertility and possibly for the demand for life insurance. While the altruistic motive gives rise to a trade-off between the quantity and quality (welfare, e.g. expenditures on education, and life insurance) of children, Becker and Lewis (1973) and Becker (1981); in the bequest-as-exchange children can be seen as a capital good, Razin and Sadka (1995, p.3), or as a form of insurance. It is widely documented that in parts of developing countries where capital markets are almost non-existent, children are considered as insurance goods and the reproductive motivation stems from the old-age security that children can provide, Jellal and Wolff (2002, p. 636). In an environment of imperfect financial market (which is the case in large parts of developing countries), Jellal and Wolff (2002) suggest that uncertainty about parental consumption during old age drive the demand for children and fertility of prudent parents to increase.

Chapter 3 of this thesis contributes in this context by investigating whether types of bequest motives have implications for life insurance consumption across countries. The chapter also investigates the long run economic relationship between the demand for life insurance and its determinants. Existing international empirical work has paid little attention to the long run relationship between life insurance consumption and its possible determinants.

As the essence of life insurance is to mitigate uncertainty about consumer's lifetime so as the consumer can allocate consumption over time optimally, it is natural to investigate the relationship between private credit consumption and life insurance development. Yaari (1965) suggests that the demand for life insurance may be motivated by the collateral motive, i.e., life insurance is demanded to facilitate consumer borrowing against future income streams and hence expand the feasible consumption set. Yaari (1965) notes that in the absence of bequest motive there must be some external restrictions on borrowing, as the consumer may wish to expand on debt accumulation. The purpose of a life insurance policy is to provide coverage for the lender or investor in case of the borrower default due to premature death.

Nevertheless, existing empirical work paid little attention to the relationship between credit consumption and life insurance.

In chapter 4 we study the demand for life insurance for a consumer without bequest motive. The chapter investigates the long run economic relationship and causality direction between life insurance development and private credit consumption across countries. This chapter represents the first empirical test of the relationship between life insurance and private credit consumption across countries.

Such an investigation is relevant as the world has not only experienced an expansion of consumer credit, but also credit consumption differs across countries and regions of the world. For instance, by the end of 2006, the overall global outstanding amount of consumer credits provided by credit institutions exceeded €4 trillion, Wyman (2008). Of the global outstanding credit, according to Wyman (2008) North America[21] accounted for 52 percent; EU 27 accounted for 25 percent; Japan, South Korea, and China accounted for 9 percent; Latin America, Middle East and South Asia regions[22] accounted for about 9 percent (3 percent each) and rest of the world[23] accounted for about 4 percent.

Moreover, a main methodological innovation in this thesis is that in all three empirical chapters we employ a relatively new panel data analysis technique, namely the Common Correlated Effects Pooled (CCEP) estimator advanced by Pesaran (2006). Previous studies employing panel technique used either fixed effects (Browne, Chung, and Frees, 2000; Beck and Webb, 2003) or the general method of moments (GMM) (Ward and Zurbruegg, 2002; Esho et al, 2004; Li et al, 2007).

A novelty of the CCEP estimator is that it takes into account the impacts of unobserved common factors (often attributable to macro-economic variables in an

[21] The region includes USA and Canada
[22] It includes Singapore, Taiwan, Thailand, Vietnam and Indonesia
[23] Africa, India, Australia and New Zealand, Russia, Ukraine, Belarus, Moldova and Turkey

integrated/globalised world) that may affect cross country insurance consumption variation. In the presence of unobserved common factors the fixed effects estimator is biased, and Arellano and Bond (1991)-type lag-instrumentation in pooled panel models is misleading (Pesaran and Smith, 1995; Lee, Pesaran, and Smith, 1997; and Swamy, Tavlas, and Hall, 2009).

Moreover, the study investigates cross section dependency in insurance consumption represented by both factor and spatial models.

Furthermore, in all three chapters we incorporate informal risk sharing institutions into the analysis of formal insurance.

1.9. Organisation of the Thesis

This thesis studies the long run economic relationship between the demand for insurance and its determinants. It contains an introductory chapter, three empirical chapters, and conclusions. The empirical analysis is provided in chapters two, three and four.

Chapter 2 investigates the long run economic relationship between the demand for general insurance and income per capita taking into account other possible determinants. The chapter utilizes three data sets. A dataset of 65 industrialized and developing economies for the year 2000, which utilizes produced capital per capita as a measure/proxy for wealth and is used in the cross section regression. Another unbalanced data set of 99 industrialized and developing economies over the period 1987-2009 utilizes GDP per capita as a measure/indicator of wealth is used to investigate the long run relationship between the demand for general insurance services and its determinants. We also use a balanced data set of 54 developed and emerging economies over the period 1992-2005 to conduct diagnostic tests on both factor and spatial interdependencies.

Chapter 3 investigates the long run economic relationship between the demand for life insurance driven by the bequest motive and its determinants. It also sheds light on the importance of the types of bequest motives as a possible determinant for life insurance consumption variation across countries. The chapter utilizes several data sets. A full unbalanced dataset of 98 industrialized and developing economies over the period 1960-2009 is used to investigate the long run relationship between the demand for life insurance services driven by the bequest motive and its determinants. We use a balanced dataset of 53 developed and emerging economies over the period 1994-2006 to conduct diagnostic tests on both factor and spatial interdependencies. In order to investigate the bequest motive we use: a dataset of 56 developing economies over the period 1960-2009; a dataset of 26 highly industrialized advanced economies over the period 1960-2009; and a dataset of 14 transition economies over the period 1986-2009.

Chapter 4 studies the long run economic relationship and causality direction between life insurance development and private credit. In this chapter we utilize two data sets. An unbalanced dataset of 98 industrialized and developing economies over the period 1960-2009 to investigate the long run relationship between life insurance and private credit consumption. In order to conduct diagnostic tests on both factor and spatial interdependencies we use a balanced dataset of 56 developed and emerging economies over the period 1993-2008.

Conclusions and summary of the findings of the thesis are in Chapter five.

Appendix A

Table 1- 1: Summary of International Empirical Studies on Life Insurance Consumption

Author(s)	Countries included	Dependent variable	Explanatory variables
Chui, and Kwok, (2009)	38 countries	Life insurance density/penetration	-National cultural indexes composed by House et al: (in-group collectivism*, power distance*, assertiveness, institutional collectivism, future orientation, gender egalitarianism, humane orientation, performance orientation, and uncertainty avoidance) -One Economic Component* (of GDP per capita, Inflation rate, and Bank development) -One Demographic Component* (of Dependency ratio, and life expectancy) Religion Investor protection index*
Park and Lemaire (2011)	27	Life penetration	Hofstede's cultural indices indexes: (power distance*, individualism dimension, masculine-feminine*, uncertainty avoidance* long term orientation*) - GDP per capita*, Bank sector development* Inflation* Herfindahl index* Urbanisation, Life expectancy* Tertiary education Political risk Common law legal system*, Dependency ratio*, Religion*
Chui, and Kwok, (2008)	41	Life insurance density	Hofstede's cultural indices indexes: (power distance*, individualism dimension*, masculine-feminine*, uncertainty avoidance) -One economic component* (of GDP per capita, expected rate of inflation, bank sector development, stock market, development, and a dummy variable to whether a country has been a socialist or not) - One Institutional Component* (of creditor right, contract enforcement, and accounting standards) -One Demographic Component* (dependency ratio and religion)

Continued

Li et al (2007)	30 OECD	Life insurance density	Disposable income* Life expectancy (significant in some regressions and insignificant in others) Number of dependent* Level of education (significant in some regressions and insignificant in others) Social security expenditure* Financial development* Foreign market share* Anticipated inflation* Real interest rate*
Beck and Webb (2003)	68 developing and developed countries	-Life insurance penetration -Life insurance density -Life insurance in savings -Life insurance in force to GDP	GDP per capita* Young dependency ratio Old dependency ratio* Life expectancy Schooling Inflation rate* Banking sector development* Gini index Urbanisation Social security Real interest rate* Expected inflation rate* Revolutions and coups Human development index Permanent income* Rule of law Inflation volatility Institutional development* Private savings* Catholic Muslim* Protestant British legal origin French legal origin Scandinavian legal origin Good crops
Ward, and Zurbruegg (2002)	16 Asian countries and 25 OECD countries	Life insurance density (per capita insurance consumption)	Civil right/role civil rights*(for Asia) Political environment for legal instability as measured by checks and balances /political* Role of law* cohesion* (for Asia) Religion* GDP per capita* Inflation* Financial development* Young dependency ratio* Life expectancy* Social welfare expenditure as % of GDP* Education*

Continued

Park et al (2002)	37 developing and developed countries	Total insurance penetration	Hofstede's cultural indices indexes: (power distance, individualism-collectivism dimension, masculine-feminine*, uncertainty avoidance) national income per capita*, socio-political instability*, degree of regulation (of insurance)*
Enz (2000)	90 developing and developed countries	Life insurance penetration	Income per capita*
Outreville (1996)	48 developing countries	Life insurance density	GDP per capita* Real interest rate Anticipated inflation* Life expectancy* Level of financial development* Rural population Education level Health status Muslim population Social security Dependency ratio Human development index Growth population rate Monopolistic market* Foreign companies in market
Browne and Kim (1993)	45 developing and developed countries	Life insurance density Life insurance in force	Income* Dependency ratio* Muslim * Social security* Expected inflation rate* Education level* Average life expectancy Policy loading
Wasow (1986)	48 developing and developed countries	Insurance premiums penetration (premium volume as % of GDP)	Income per capita* Population* Money supply relative to GNP Government spending relative to GNP Inflation rate* Service imports relative to GNP The output-capital ratio Gross savings relative to GNP* Islamic society* Regulation of insurance industry (10 policies)
Beenstock, Dickinson, and Khajuria (1986),	10 industrialised countries	Life insurance density	Disposable income* Percentage of working population employed in the service sector* Social expenditures per capita* Gross savings per capita Real interest rate De-trended unemployment Country price index* Life expectancy* Income distributions variable Dependency ratio* Potential buyers of life insurance as % of total population* Average age of potential buyers of life insurance*
"*" indicates that the variable was reported to be statistically significant at least at 10 percent level of significance.			

Table 1- 2: Summary of International Empirical Studies on Nonlife Insurance Consumption

Author(s)	Countries included	Dependent variable	Explanatory variables
Park and Lemaire (2011)	82	Nonlife penetration	Hofstede's cultural indices indexes: (power distance*, individualism dimension*, masculine-feminine, uncertainty avoidance*) GDP per capita*, Herfindahl index* Urbanisation*, Tertiary education Political risk* Common law legal system*, Muslim*
Nakata and Sawada (2007)	Two data sets, 32, and 54 developed and developing countries	nonlife insurance density(income/wealth)	GDP per capita*, Produced assets per capita*, Financial development(Liquid liability), Contract enforceability*, Gini Coefficient, population size,
Esho et al (2004)	44 developed and developing countries	nonlife insurance density	Enrolment ratio of secondary education, Hofstede's Uncertainty Avoidance Index, number of property thefts per 100,000 persons*, Cross Section) legal origin system (English, French, German, or Scandinavian), property rights index*,(Panel) real GDP per capita*, (Panel) premiums divided by claims, urbanisation*(Cross Section)
Browne, Chung, and Frees (2000)	25 OECD countries	Motor Vehicle-insurance density General Liability-insurance density (per capita insurance consumption),	GNP per capita*, Wealth per capita*, market share of foreign insurers*, the enrolment ratio of third-level education, Urbanization, Dummy for legal system (1 if common law systems and 0 if statutory-law systems)*.
Park et al (2002)	37 developing and developed countries	Total insurance penetration	Hofstede's cultural indices indexes: (power distance, individualism-collectivism dimension, masculine-feminine*, uncertainty avoidance) national income per capita*, socio-political instability*, degree of regulation (of insurance)*
Enz (2000)	88 developing and developed countries	nonlife insurance penetration	GDP per capita*

Continued

Outreville (1990)	55 developing countries	nonlife insurance density, nonlife insurance penetration	per capita GDP*, inverse of the loss ratio, financial development*, market structure (dummy type 1/0), inflation country-specific variables: (human capital endowment (proxied by the percentage of the labour force with higher education*) and the agricultural status of the country (proxied by the percentage of the agricultural labour force))
Wasow (1986)	48 developing and developed countries	Insurance premiums penetration (premium volume as % of GDP)	Income per capita* Money supply relative to GNP Government spending relative to GNP Inflation rate Service imports relative to GNP The output/capital ratio Regulation of insurance industry (10 policies)
Beenstock, Dickinson, and Khajuria (1988)	Two data sets 12 industrialised countries- and 45 industrialised and developing countries	nonlife insurance density	GNP per capita*, interest rates*
"*" indicates that the variable was reported to be statistically significant at least at 10 percent level of significance.			

Chapter 2:

The Demand for General Insurance Consumption across Countries: Is Insurance a Superior Good?

2.1. Introduction

Although there is no doubt that insurance is an effective institution in minimizing the costs of risk to society, there is a wide variation of nonlife insurance consumption across countries. The insurance company Swiss Re (2010), reports that nonlife insurance density (consumption per capita) amounted, for instances in 2009, in the U.S.A., the U.K. and Japan, to about US$ 2107; US$ 1051, and US$ 840, respectively. A similar pattern of high insurance consumption may be observed in other developed economies. However, insurance density is low in developing countries and transition economies. According to Swiss Re, in 2009, insurance density in Brazil, Thailand, China, India and Russia amounted to about US$ 124; US$ 63; US$ 40; US$ 7; and US$ 276, respectively, while in Kenya and Nigeria accounted for about US$ 13, and US$ 5, respectively.

A number of empirical studies tend to suggest that, cross-country insurance consumption variation is attributable to differences in income per capita. Beenstock, Dickinson, and Khajuria (1988) study the relationship between income and insurance consumption using pooled annual cross-section data for 12 developed countries over 1970-1981, and cross-section regression for 45 developed and developing countries in 1981. They report income elasticity with respect to insurance greater than unity. Beenstock, Dickinson, and Khajuria (1988) result is based on one explanatory variable, namely per capita income. Using cross-section regression data for 55 developing countries, Outreville (1990) investigated the relationship between general insurance and economic and financial development and reports a similar result. Enz

(2000) using a logistic function and panel data for 88 countries over the years 1970-98 suggested that income elasticity is equal to unity at specific low and high income levels and it is greater than unity for intermediate income levels. However, the logistic function used by Enz (2000) is a one factor model -in this case per capita income- and neglects all other variables that influence the demand for insurance services. Browne, Chung, and Frees (2000) highlighted economic factors and the form of legal systems in explaining insurance consumption variation across OECD countries over the period 1987- 1993. They employed fixed-effects and pooled cross-section analysis, and found positive (negative) relationship between income (wealth) and motor vehicle and general liability insurance.[24] Esho et al (2004) incorporated the role of legal aspects into the demand for insurance services and include, among other things, income per capita as an explanatory variable. They used a dataset of 44 developed and developing countries over the period 1984-1998, and OLS and GMM dynamic system estimator, and reported income elasticity of approximately unity or less than unity. Notably, while the OLS results are based on fitted values of real GDP, the GMM results are based on real GDP per capita.[25] However, the sample of countries is relatively small and the GMM regressions did not include probability of loss indicator.

Recently, Nakata and Sawada (2007) estimated a demand function for general insurance using partially linear regression model with a non-parametric component for the year 1994.[26] While the non-parametric part includes income or wealth (produced capital) per capita, the parametric part includes other explanatory

[24] They include income together with wealth in the cross section regression.
[25] Explanatory variables in the OLS regressions include risk aversion, probability of loss, price of insurance, the law and real fitted GDP per capita, and the GMM regression include risk aversion, the law, real GDP per capita and lagged price of insurance, and the dependent variable.
[26] There is no information about the sample of countries used in the paper, although regression results show that the number of observations is 54 and 32.

variables. In their model, the dependent variable is the ratio of aggregate premiums to the initial wealth (produced capital) alternative GDP. They reported wealth elasticity greater than unity for low wealth countries, and less than unity for upper-middle and high wealth countries. They also reported income elasticity greater than unity, and argued that since the theory of the demand for insurance (see Arrow, 1965) specifies that the demand for insurance depends on its price and the initial wealth rather than income, then the relationship between income and insurance demand is spurious. Surprisingly, they did not report any statistical test to support their assertion.[27]

The studies of Beenstock, Dickinson, and Khajuria (1988), and Enz (2000) do not take into account explicitly other factors that derive the demand for insurance services than the level of income. However, the demand for insurance services is also motivated by the law, transaction costs and is likely to be governed by the level of socioeconomic development. These factors need to be taken into account when computing the elasticity of income with respect to insurance services. Subsequent studies, namely Outreville (1990) Browne, Chung, and Frees (2000), Esho et al (2004) and Nakata and Sawada (2007) incorporated the law, and financial development to the demand for insurance services.

However, the socioeconomic development factor has not been incorporated into the demand for general insurance consumption. That is, previous studies use cross country insurance consumption data without taking into account informal risk

[27] At a micro level, Galabova and Lester (2001) addressed the question whether insurance is a luxury or necessary item using households' expenditure survey data for 13 European Union countries and seven developing countries. They found that the correlation between the share of insurance expenditure decreases as total expenditure rises (they use expenditure as a proxy for income) for developed and developing countries. Although relative risk aversion for consumption is likely to diverge from that of wealth as pointed out by Meyer and Meyer (2005), this finding indicates the relevance of decreasing risk aversion.

sharing institutions used in the developing world. Therefore, we contribute to the empirical literature by incorporating informal risk sharing institutions variable as a determinant of general insurance consumption variation across countries. Insurance in its simplest form is risk shifting regardless of the institutional form, i.e. formal or informal. As shown by Arrow (1996) it is advantageous for economic agents to trade insurance or simply agree to help each other/share losses in case of a loss. Without taking into account informal insurance schemes, computed insurance density is less likely to reflect the real (actual) insurance density.

Furthermore, the main existing cross-countries' empirical work on the relationship between per capita income and insurance density is based on cross-section OLS analysis (see Beenstock, Dickinson, and Khajuria, 1988; Outreville, 1990; and Nakata and Sawada, 2007). These studies do not investigate the long run relationship between per capita income and insurance consumption. These would include whether per capita income and insurance cointegrate or not. In this context, Lee, Hsu and Lee (2010) study the stationarity properties of non-life insurance consumptions per capita for 31 countries over the period 1979-2005 and report that nonlife insurance density is nonstationary for most countries. However, they did not investigate either the demand function or aspects of cointegration and error correction. Moreover, with the exception of Enz (2000) other studies use relatively a small sample of countries.

All these issues may indicate the need to re-examine the relationship between income and general insurance consumption across countries. Our intention is to facilitate a better understanding for the sources of general insurance consumption variations across countries, and hence the role of insurance market in economic development.

Therefore, the aim of this chapter is to investigate empirically the long run economic relationship between general insurance consumption and income per capita across countries taking into account observed heterogeneity and possible omitted variables. The chapter employs cross section and a panel data analysis to a large sample of countries. The chapter utilizes three data sets. A dataset of 65 industrialized and developing economies for the year 2000 that utilizes produced capital per capita as a measure/proxy for wealth and is used in the cross section regression.[28] Another unbalanced panel data set of 99 industrialized and developing economies over the period 1987-2009 utilizes GDP per capita as a measure/indicator of wealth is used to investigate the long run relationship between the demand for general insurance services and its determinants. We also use a balanced data set of 54 developed and emerging economies over the period 1992-2005 to conduct factor and spatial diagnostic tests.

The rest of the chapter is structured as follows: in Section 2.2 we highlight the determinants of the demand for general insurance. Section 2.3 outlines the economic and the econometric model. Section 2.4 deals with variable measures and data description. Estimation results and conclusions are in Sections 2.5 and 2.6 respectively.

[28] We have used a one year cross section for the purpose of comparison with previous studies. In another data set that contains produced capital per capita as a measure/proxy for wealth for 74 developing and developed countries over the years 1995, 2000, 2005 and nonoverlapping five years average for all other variables during 1995-2009 we employed pooled cross section analysis, the results are qualitatively similar and not reported here.

2.2. Determinants of the Demand for General Insurance Services

This section outlines the determinants of the demand for general insurance services. These variables consist of risk aversion, socioeconomic development, price of insurance, the law, and transaction costs. Each of these elements will be highlighted briefly below.

2.2.1. Wealth and Risk Aversion

Insurance aims at mitigating wealth losses and damage. High levels of wealth imply, on the one hand, high insurable assets, and the ability to pay for insurance coverage. On the other, depending on individual's risk aversion preferences, wealth changes affect the demand for insurance coverage.

Arrow (1965, p.35) hypothesized the relative risk aversion is an increasing function of individual's wealth. In contrast, the logarithm utility function proposed by Bernoulli displays constant relative risk aversion. Mossin (1968) has shown that if an economic agent has a decreasing absolute risk aversion and the price of insurance includes a positive loading, then the maximum acceptable premium decreases as wealth increases. That is, insurance is an inferior service.

Empirically, Szpiro (1986) using country time series data on general insurance premiums for 15 developed countries investigates the hypothesis of relative risk aversion. He reports that the hypothesis of constant relative risk aversion cannot be rejected for most countries. Szpiro and Outreville (1988) expand Szpiro (1986) analysis to 31 countries of which 11 countries are developing ones and reaffirm the previous result. In light of these findings[29] we use a constant relative risk aversion

[29] See also Friend and Blume (1975). They also found evidence for constant relative risk aversion in their study on household assets holdings.

function in the economic model in Section 2.3; though we acknowledge that other utility functions cannot be excluded.

However, the findings of cross country studies on nonlife insurance consumption regarding risk aversion are inconclusive. Outreville (1990), and Browne, Chung, and Frees (2000)[30] reported negative and significant risk aversion coefficient. In contrast, Park and Lemaire (2011) reported positive and significant coefficient of risk aversion.[31] The weak evidence for risk aversion is likely to cast doubt about the suitability of the proxy used for risk aversion rather than risk aversion preferences. Therefore, we assume a positive relationship between risk aversion and nonlife insurance consumption.

By the same token, empirical evidence for wealth is inconclusive. While Browne, Chung, and Frees (2000) used income together with wealth in the cross section regression and reported negative relationship between wealth and nonlife insurance consumption, Nakata and Sawada (2007) reported positive relationship between wealth and nonlife insurance consumption. The studies seem to suggest that wealth and income are different things. However, wealth may be viewed as the capitalised value of long run income, or the value of future consumption (see the World Bank, 2006). Therefore, we tend to adopt the latter approach in this chapter. In this regard, empirical studies of Wasow (1986), Beenstock, Dickinson, and Khajuria (1988), Outreville (1990), Browne, Chung, and Frees (2000), Esho et al (2004), Nakata and Sawada (2007), and Park and Lemaire (2011) report significant and positive relationship between nonlife insurance consumption and income.

[30] The finding is in the general liability pooled cross section regression

[31] Browne, Chung, and Frees (2000) used education to proxy for risk aversion, and Park and Lemaire (2011) used Hofstedt's uncertainty avoidance index.

2.2.2. Price of Insurance

Insurance price consists of the expected loss (actuarially fair price), and most likely a loading. In his analysis of property insurance, Mossin (1968, pp.556-557) has shown that it is optimal for an individual to purchase full coverage if insurance is sold at actuarial fair price. However, Mossin's theory suggests that it is optimal for the individual to purchase less than full coverage if the price of insurance contains a loading. A similar analysis of property insurance is also provided by Smith (1968). This may suggest that the demand for insurance services is inversely related to its price

Outreville (1990) reported negative but insignificant relationship between the demand for insurance and its price. In contrast, Esho et al (2004) reported a negative and weakly statistically significant relationship between the demand for property and liability insurance and its price.[32]

2.2.3. Socioeconomic Development

Although it is widely recognized that the demand for insurance is motivated by risk aversion as shown by Arrow (1965) and Pratt (1964), it is less clear the role of socioeconomic development on the institutional choice to deal with risk in a society.

Nevertheless, observation suggests a relationship between the level of socioeconomic development and risk shifting/spreading institutions in a society. In an early stage of development non-market institutions or personal arrangements (informal risk sharing institutions) are more likely to prevail in a society. As the society develops, the less dependent on informal risk sharing institutions it becomes and the more it uses market institutions (formal institutions or impersonal

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[32] Other studies either omit the price variable or use indirect measures.

arrangements). However, during the process of development one may expect both formal and informal financial institutions to coexist. Indeed, current financial systems in many developing countries may be described as dualistic ones, Mauri (2000). That is, financial systems consist of both informal and formal financial institutions. Informal risk sharing institutions are based on reciprocity whereby enforcement is based on reputation and mutual trust may overcome at negligible costs problems of moral hazard and adverse selection.

Moreover, much of the advanced risk transfer mechanisms are not used in many parts of developing countries. A plausible explanation is that these institutions use complex technologies and may require certain level of socioeconomic development. Therefore, socioeconomic development affects the institutional choice of insurance institutions in a country.

These ideas may be restated using North (1989, 1990) analysis to markets. Analyzing the evolution of markets he distinguishes between three stages. According to North, the earliest exchange market is personal exchange which may be found in a subsistence traditional economy, whereby trade is confined to villages and among people who know each other and depend on informal constraints, and transaction costs are low or inexistent. As economic activities expand, according to North, personal exchange evolves to limited impersonal exchange, which is still mainly governed by informal constraints based on kinship ties, exchanging hostages, or merchant codes of conduct. The third stage in North analysis is the creation of capital markets and the industrialization of economy lead to the emergence of more complex exchange, the modern impersonal exchange with third-party enforcement. He suggests that this stage requires well defined and enforced property rights and contracts, as well as effective institutional structures to reduce transactions costs.

North's analytical framework may facilitate the understanding of the prevalence of informal financial institutions in the developing world. North stresses that for a market to transform/evolve from one stage to the following stage, requires an appropriate institutional and governance structure. The implication is that exchange markets (informal financial risk sharing institution) in the developing world did not evolve into the advanced impersonal stage (formal insurance) due to weak or lack of the required institutional infrastructure. The framework has been employed by Nissanke and Aryeetey (2006) to describe financial fragmentation in Sub-Saharan Africa. They suggest that dualistic financial systems in the developing countries are not a result of the natural course of market evolution, but as a result of modern financial systems being superimposed on traditional subsistence societies, without necessary adaptations. As Patrick (1966) noted, formal financial institutions in the developing world mainly followed the supply leading approach- were introduced by post colonial newly independent states- rather than a response to a growing domestic demand as in the developed world.[33]

The question that arises is whether informal financial institutions are complements or substitutes to formal financial institutions. The theory of imperfect information suggest that informal financial institutions are substitute for missing credit, insurance and futures markets due to problems of asymmetrical information and moral hazards (Bardhan, 1999; and Hoff, Braverman and Stiglitz 1993). For instance, traditional multi-peril crop insurance programs in many developing countries failed mainly due to problems of moral hazards and adverse selection, Hazell (1992).[34]

[33] For empirical evidence see Jung (1986) and Fritz (1984).

[34] Another view is that informal financial institutions are complement to formal financial institutions. Informal financial institutions serve remote rural populations and small business entrepreneurs who have no access to formal insurance. In some cases informal financial institutions serve as a channel of formal insurance services. During the last decade, efforts have been made to improve informal

2.2.4. The Law

The law has direct and indirect positive impacts on the demand for general insurance services. The law may require compulsory insurance coverage, Skogh (1999, pp.529-530). Examples include compulsory vehicle coverage; permit to run a business and worker's compensation insurance etc. Moreover, a prevalence of well protected property rights and contract enforcement may have an overall positive impact on the demand for formal insurance.

Browne, Chung, and Frees (2000) reported significant and positive impact of the legal system on the purchase of motor vehicle and general liability coverage. They found that risk aversion has no significant impact on motor vehicle insurance (a coverage purchased primarily by households). This may suggest the presence of direct impacts of law, i.e., compulsory coverage on the part of the motor vehicle coverage. In the same line, Esho et al (2004), and Nakata and Sawada (2007) found a positive and significant relationship between the protection of property rights and contract enforcement and nonlife insurance consumption.

2.2.5. Transaction Costs

The demand for general insurance services is also motivated by transaction costs. Although many economic agents e.g., widely held corporate business, are risk neutral agents or they are able to diversify insurable risks, they purchase insurance coverage at actuarially unfair rates, which would imply a reduction in stockholder wealth, Mayers and Smith (1982, p.293). Main (1982) shows that widely held firms are indifferent and would not benefit from insuring against pure, specific, or systematic

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schemes employing formal insurance principles at the micro level, i.e., microinsurance, (see Churchill, 2006).

risks. Mayers and Smith (1982, p.293) argue that corporate insurance purchases are motivated by

"*the ability of insurance contracts to (1) allocate risk to those of the firm's claimholders who have a comparative advantage in risk bearing, (2) lower expected transactions costs of bankruptcy, (3) provide real-service efficiencies in claims administration, (4) monitor the compliance of contractual provisions, (5) bond the firm's real investment decisions, (6) lower the corporation's expected tax liability, and (7) reduce regulatory constraints on firms*."

Skogh (1989, p.727) argues that transaction costs explains the demand for insurance by risk neutral agents and the transaction costs approach is complementary to the pooling of risks theory that explains the demand for insurance by risk averters. He also indicates that an insurance company is assumed to have a comparative advantage in risk management services. The level of financial development is likely to enhance potential comparative advantages of an insurance carrier. The basic function of a financial system is to facilitate mobilizations of savings, allocation of capital and diversification of risk, as well as trading of goods and services, Levine (2005, p.5). To the extent that the financial system succeeds in these functions, it enhances not only the entire economic system, but also has an overall positive impact on the demand for general insurance services. Rule (2001,p.141) notes that risks (e.g., credit risk, market risk and insurance risk) can be minimized /diversified through shifting/ transferring amongst the different components of the financial system both at domestic and international financial system levels. According to the author, such a risk transfer is motivated by cost efficiency, the difference in the regulatory, accounting and tax treatment of different types of financial institutions. Hoyt and Khang (2000) using US data on widely held firms reported results consistent with the various outlined theoretical arguments on corporate demand for insurance. Outreville (1990) investigated the relationship between financial development and insurance and reported a positive relationship between insurance and financial development.

2.3. Economic Model and Econometric Framework

This section describes the economic model and econometric framework to be employed in this chapter.

2.3.1. The Economic Model

Consider a risk averse economic agent with wealth (assets) A and a long run income W. Agent's wealth can be viewed as equal to the capitalised value of her long run income, that is, $A=\lambda W$ where $\lambda>1$ is a capitalisation factor.[35] Assume that the agent faces a loss L with probability π and that the agent has a von Neumann-Morgenstern (VNM) utility function U with $U'>0$ and $U''<0$. Assume also there is an insurance market under perfect information with no asymmetric information and transaction costs. Let q denote insurance coverage and p the rate of insurance premium. The agent will obtain the desired coverage at a fair premium. That is, $p=\pi$. Then, we can write agent's insurance decision as maximizing the expected utility of her wealth as follows:

$$Max\, EU = \pi U(A_b) + (1-\pi)U(A_g) \tag{2.1}$$

where $A_b = A - pq - L + q$ and $A_g = A - pq$ with subscripts b and g denote bad and good states, respectively. That is, A_b and A_g , are wealth levels in the loss and non-

[35] Such a view of wealth implies that the agent displays the same relative risk aversion of payoffs, whether it is expressed in wealth or long run income, Hardaker (2000, pp.10-11). This allows analyzing agent's risk preferences using wealth or long run income. Note that, this view is in contrast to Browne, Chung, and Frees (2000), and Nakata and Sawada (2007) who view wealth and income as different.

loss states, respectively. Differentiating equation (2.1) with respect to q and rearranging gives the first order optimality condition:

$$(1-p)\pi U'(A_b) = p(1-\pi)U'(A_g), \quad \text{or} \quad \frac{(1-p)\pi}{p(1-\pi)} = \frac{U'(A_g)}{U'(A_b)} \tag{2.2}$$

As the second order condition is negative, and with actuarial insurance premiums the agent will choose full insurance coverage that is,

$$q = L \tag{2.3}$$

Under such assumptions, agents will trade risk directly without intermediaries.

However, assumptions of perfect information and no transaction costs are hardly met outside relatives, families and small villages. This may explain the prevalence of informal risk sharing in the developing world. In a more complex environment agents may not be able to trade risk directly. One explanation is asymmetric information. Another one is geographical dispersion. This may justify the need for insurance intermediaries for the trade of risk. They may specialize in risk diversification, and benefit from economies of scale and scope. Therefore we will assume instead, the presence of imperfect information and transaction costs. In this case, in order to derive the demand function for insurance we may utilize the following power utility function[36]:

$$U = A^{\gamma} \tag{2.4}$$

where $0 < \gamma < 1$, for $\gamma = 1$ the function implies risk neutrality, otherwise the function implies risk aversion. Of course, other utility functions may also be used, keeping in mind that any form of utility function has implications for absolute and relative risk aversion and consequently for the demand for insurance. This function implies constant relative risk aversion and elasticity of wealth/income less than unity. After

[36] The power utility function is of the type used by Beenstock, Dickinson, and Khajuria, (1988).

employing the utility function (2.4) in the first order equation (2.2) and rearranging, instead of equation (2.3), we obtain:

$$q = \frac{A(1-\frac{(1-p)\pi}{p(1-\pi)})^{\frac{1}{\gamma-1}} + (\frac{(1-p)\pi}{p(1-\pi)})^{\frac{1}{\gamma-1}} L}{p(1-(\frac{(1-p)\pi}{p(1-\pi)})^{\frac{1}{\gamma-1}}) + (\frac{(1-p)\pi}{p(1-\pi)})^{\frac{1}{\gamma-1}}} \tag{2.5}$$

Therefore, the demand for insurance will depend on the level of initial wealth, risk aversion, the severity and probability of the loss, and the loading (e.g. transaction and administrative costs in excess of the expected loss). As a basis for a reduced form estimating equation, equation (2.5) may be written as:

$$q = f(A, \gamma, p, \pi, L) \tag{2.6}$$

The derived demand function in equation (2.6) is motivated by risk aversion, i.e., $0 < \gamma < 1$. Therefore, one needs to take into account the use of informal risk sharing institutions (InfFins). Moreover, the total demand function for insurance services needs to incorporate the demand for insurance motivated by law (Ins), and transaction costs (TC). Therefore, equation (2.6) may be modified, to include these variables, as follows:

$$q = f(A, \gamma, p, \pi, L, InfFins, Ins, TC) \tag{2.7}$$

The expected partial derivatives of equation (2.7) are as follows: $\partial q/\partial A \geq\leq 0$; $\partial q/\partial \gamma > 0$; $\partial q/\partial p < 0$; $\partial q/\partial \pi > 0$; $\partial q/\partial L > 0$; $\partial q/\partial InfFins >< 0$; $\partial q/\partial Ins > 0$; $\partial q/\partial TC > 0$.

The partial derivative with respect to wealth may be positive, negative or zero. On the one hand, as agent's wealth increases, risk aversion declines. That is, the agent tends to assume more risk. On the other, the more affluent the agent is the more properties/assets has to insure. Therefore agent's total demand for insurance will depend on which factor dominates. The empirical result in this chapter suggests a positive partial derivative with respect to wealth/income. However, since the estimated model does not include data on losses (due to data unavailability) the result is likely to be suggestive. Nevertheless, it does not support the hypothesis of a negative wealth effect.

The expected partial derivative with respect to the price of insurance is negative. However, as we use the level of infrastructural development in a country to indicate insurers' ability to provide cost effective insurance services we expect the partial derivative to be positive. The empirical result suggests a positive relationship between insurance consumption and infrastructural development. In other words, the lower the level of infrastructural development, the lower is the demand for insurance possibly due to higher costs of insurance services.

The predicted sign of the partial derivative with respect to risk aversion, the probability of, and amount of loss is positive. Arrow (1965) and Pratt (1964) show that the purchase of insurance coverage is related to the degree of risk aversion. Mossin (1968) shows that agent's willingness to pay for insurance coverage increases with the probability of, and size of the loss. Schlesinger (1981) shows that an individual with higher probability of loss, and higher degree of risk aversion will purchase more insurance coverage. The empirical result in this chapter lends support to the theoretical prediction on positive impact of risk aversion on general insurance consumption. However, the finding suggests that probability of loss is insignificant.

The partial derivative with respect to informal institutions may be negative or positive, depending on whether both formal and informal insurance institutions serve the same market or different markets (Ghate 1988, p.75 as reported in Nissanke and Aryeetey, 2006, p.20). If they compete to serve the same segment of clients, they can be considered as substitutive for each other and hence the partial derivatives will be negative. However, if each form of insurance serves different market segments, then both forms are complementary, and hence the positive sign of the partial derivative. Unfortunately, we are not in the position to determine which effect will dominate on the total demand for insurance services. However, the empirical results in this study suggest that informal insurance institutions tend to be a substitute for formal insurance.

The sign of the partial derivative with respect to the law is expected to be positive. The prediction is based on possible positive impacts of contract enforcement and mandatory coverage. In line with this theoretical prediction, the empirical result suggests a positive impact of law on general insurance consumption.

The partial derivative with respect to transaction costs is positive as it represents the demand for general insurance by risk neutral agents. The empirical finding lends support to the hypothesis of a positive impact of transaction costs/financial development on the demand for insurance.

Table 2-1 displays a summary of hypothesized signs for all explanatory variables and proxies used.

2.3.2. Econometric Framework

Equation (2.7) is the basis of the following reduced form equation to be estimated:

$$q = \alpha + \beta' X + \varepsilon \tag{2.8}$$

where q is the dependent variable, X is a vector of explanatory variables, ε is a white noise term, α is the constant term, and β is a vector of coefficients.

We use OLS cross section regression and standard panel data analysis. OLS cross section analysis is only used with produced capital (indicator of wealth as it is time invariant) and as a baseline estimate. For the panel part the estimation and statistical tests will be based on the Common Correlated Effects Pooled (CCEP) method advanced by Pesaran (2006). We will estimate the following specification:

$$q_{it} = \alpha_i + \beta_i' X_{it} + \varepsilon_{it} \tag{2.9}$$

$$\varepsilon_{it} = \gamma_i f_t + e_{it} \tag{2.10}$$

$i = 1,....N; t = 1,...T,$

where q_{it} denotes insurance density/insurance penetration in the i^{th} country at time t, and is the dependent variable (in natural logarithmic form) and X_{it} is a vector of explanatory variables including GDP per capita (in natural logarithmic form), transaction costs/financial development, probability of loss, risk aversion, physical infrastructural development, informal risk sharing institutions (in levels as these variables are in percentage) and the law indicator, and α_i is a country specific intercept, and ε_{it} is the error term.

In order to account for possible cross-section dependence in equation (2.9) we assume that the errors have the multifactor structure as given in equation (2.10), where f_t is the b×1 vector of unobserved common effects and e_{it} is a country specific error assumed to be independently distributed. Correlation implied in equation (2.10) may arise due to global shocks, economic and financial integration, which is increasingly common among countries in a given geographical region and in different countries, Anselin (1988). In the specification given in (2.9) we allow X_{it} to be correlated with the unobserved common factor f_t. These unobserved common factors, i.e., global shocks, economic and financial integration can affect insurance penetration/density directly via the factor structure (2.10) and indirectly via the explanatory variables.

Pesaran (2006) suggests that unobserved common factors can be proxied by the cross section averages of the dependent and all explanatory variables. He indicates that the intuition behind his proposal is that all factors that are not captured by the observable explanatory variables in our model are captured by the unobserved common factors, which are allowed to have heterogeneous factor loadings across countries. Such a representation according to Pesaran (2006) eliminates common unobserved factors, and enables to obtain unbiased estimates of the parameters on the observed explanatory variables. Therefore, we will estimate the following equation after incorporating the unobserved factors:

$$q_{it} = \alpha_i + \beta_i' X_{it} + h_i' \overline{W}_t + e_{it} \tag{2.11}$$

where $\overline{W}_t = (\ln \overline{q}_t, \overline{X}_{it})'$; $\ln \overline{q}_t$ is cross section averages of the dependent variable, and $\overline{X}_t$ is a vector of cross section average of independent variables. We will compute the CCEP estimator for the average of the slope coefficients, Pesaran (2006). The Fixed Effects method differs from the CCEP method on the assumption that h_i' is zero, and the β_i' are the same.

In order to investigate cross section correlation in the data we use the average pairwise correlation coefficient and two diagnostic tests of cross-section dependence, namely the Pesaran (2004) CD_ρ test and the CD_{LM} test suggested by Frees (1995), (see appendix B). We also test for the presence of spatial dependence using Moran's *I* test found in Kelejian and Prucha (2001):

$$I = \frac{\sum_{t=1}^{T}\sum_{i=1}^{N}\sum_{j=1}^{N} w_{ij}\tilde{e}_{it}\tilde{e}_{ij}}{(T\sum_{i=1}^{N}\sum_{j=1}^{i-1}(w_{ij}+w_{ji})^2 \delta_i^2 \delta_j^2)^{½}} \xrightarrow{D} N(0,1) \tag{2.12}$$

where $\delta_i^2 = \delta_j^2 = \frac{1}{T}\sum_{t=1}^{T}\tilde{e}_{it}^2$, $\tilde{e}_{it}^2, i = 1,....., N$, being the residuals in (2.9) and $w_{i,j}$, i,j=1,.....,N, are the spatial weights. The test is asymptotically normally distributed as N approaches ∞, for fixed T. In the computation of the Moran's I statistics we have adopted weights based on the inverse of the distance between capital cities. Relative spatial positions of capital cities are expressed in latitude/longitude points and are represented by spatial weights matrix (Ω) with dimension N×N. The spatial weights matrix quantifies the spatial dependence/relationships between different countries. More specifically it represents the extent to which insurance consumption in a country is associated with insurance consumption in neighbouring countries (see Anselin, 2006). We use a balanced dataset3 that contains 54 developed and emerging economies over the period 1992-2005 to investigate the presence of spatial effects. As the dataset consists of i=1 to N=54 countries, and for each country we have j=1 to k=54 countries of neighbours, for the time periods t=1992(1)-2005(T). The weight matrix is:

$$\Omega=\begin{pmatrix} w_{i,j}(t=1992) & 0 & 0 \\ 0 & \ddots & 0 \\ 0 & \dots & w_{i,j}(T=2005) \end{pmatrix}$$

where $w_{i,j}$ is a 54∗54 matrix and the complete weighting matrix Ω is a 756∗756 matrix, (i.e., 756=14x54). Spatial dependency simply means that distance affects economic behaviour in the sense that neighbouring countries have/use similar insurance institutions/ risk sharing institutions /consumption levels due to spatial correlation in variable measurement or spatially connected omitted variables. In the analysis of insurance consumption variation across countries, such factors may not be captured by the theoretical model. Therefore, one needs to control for such plausible effects.

2.4. Data Sources, Measures and Summary Statistics

As an indicator of wealth we use produced capital per capita if not available we use GDP per capita.GDP per capita is used to proxy long run income. Data on produced capital per capita is from World Bank's web site on wealth of nations. Produced capital data is given in 2000 US$. Annual data on GDP per capita at constant 2000 US dollars is from World Development Indicators (WDI).

From an insurance carrier's perspective, insurance price includes the expected claim, and loading. Such information, however, is not available to us. Dickinson, and Khajuria (1988) omitted the price variable, while Outreville (1990) and Esho et al (2004) use the inverse of the loss ratio; and Browne, Chung, and Frees (2000) use the share of foreign insurers in the market as a proxy. We believe that when studying the determinants of insurance consumption across countries at different stages of development an important element is not only insurers' incurred costs but also potential costs in excess of the expected loss that depend on the levels of physical infrastructural development. These costs vary across countries most likely due to the variation of physical infrastructural development. Poor physical infrastructures such as poor roads and poor communications technologies will likely to be associated with high insurance costs. For a formal financial institution to operate in a remote rural area in a developing country, for instance, both fixed and operation costs may be high compared to potential transactions, which are in many cases of small scale type ones, (World Bank, 1989, p.112). These elements may limit/facilitate the use and development of insurance services. The implication is that the more developed a country's physical infrastructure (e.g., paved roads and bridges, electricity, and telecommunications) the less costs (e.g., business start up, and transaction costs) incurred by formal insurance services. Level of infrastructural development is important for choosing firm geographical location both in a country and among countries. A difficulty may be to measure infrastructural development in a country. Straub (2011, pp.693-694) discusses the merits and deficiencies of different physical infrastructural development indicators used in empirical studies. He notes that number of phone lines, kilometres of roads, or electricity generating capacity have become the standard cross country physical infrastructural development indicators. Canning (1998) provides a description of these and related physical infrastructural development indicators across countries. Although infrastructural development has several dimensions empirical studies, often, use main telephone lines as a proxy for infrastructural development in a country (see for empirical studies on economic growth and infrastructure Easterly,2001; Loayza, Fajnzylber and Calderón, 2005; and Lopez's (2003) study on assessing the impacts of pro growth policies on inequality). The use of a single-infrastructure sector indicator telephone mainline is attributable to data availability and high correlation found between telephone main lines and electricity generated and paved roads (Loayza, Fajnzylber and Calderón, 2005; Lopez, 2003) as well as between telephone main lines and the first principal component of the these three variable, Lopez (2003). Straub (2011) also indicates that total road length and electricity generation capacity indicators are likely to be of low accuracy and quality as infrastructural development indicators.

In the context of financial development, in a cross country study on measuring banking services outreach and its determinants, Beck, Demirguc-Kunt and Peria (2007) use the ratio of telephone mainlines per capita as a proxy for physical infrastructural development, in particular communication infrastructure. They argue that "(b)*etter infrastructure reduces the cost of banking service delivery and makes the extension of bank outlets more cost effective, thus increasing the access to and use of banking services*.", p.258.

Following this literature, this chapter uses fixed telephone mainlines subscribers (per 100 people), (see Straub 2008) as an indicator (proxy) for physical infrastructural development in a country. We use telephone mainlines as data on the variable is available, and has the largest cross-country and time series coverage, on the one hand. On the other hand, financial institutions are increasingly using information and telecommunications technology such as, the internet and the telephone in the provision of financial services and expansion of their activities to a wider clientele with low transaction costs, (see World Bank, 2008, p.100). In such a case, Kumar (2005, p.214) indicates that the cost of financial services depends primarily on the costs of telecommunication services.

It is more likely that the more developed a country's physical infrastructure, the more telephone mainlines (per 100 people) and vice versa and that the more developed infrastructure a country has the lower the cost is for providing insurance services. In other words, the level of infrastructural development in a country is assumed to affect insurers' ability for providing cost effective insurance service, and therefore is used as a proxy for cost effectiveness of insurance services. Data on telephone mainlines per 100 people is from the WDI.

Due to unavailability of data on loss probability, Browne, Chung, and Frees (2000) and Esho et al (2004), used the degree of urbanisation in a country as a proxy for the risk of loss. Other studies neglected this variable. Browne, Chung, and Frees (2000) argue that a high rate of accidents and losses is more likely to occur in more urbanized areas, whereby high concentration of assets and risks. Following these authors we also use urbanization as a proxy for the probability of the loss in this chapter. Data on urbanization is from the WDI. Data on losses are not available to us and will be omitted.

By the same token, due to unavailability of data on risk aversion, previous studies often used the level of education as a proxy for risk aversion. It was used by Browne and Kim (1993), Browne, Chung, and Frees (2000), and Esho et al (2004). Higher education level is likely to be associated with greater risk aversion and greater risk awareness; hence it promotes the demand for insurance, Outreville (1990, p.494) and Browne and Kim (1993, p.624). In this chapter, we use the gross enrolment ratio of secondary education as well as the gross enrolment of tertiary education to proxy risk aversion. Data on educational secondary and tertiary gross enrolment ratios are all from WDI and United Nations Educational, Scientific and Cultural Organization (UNESCO) Annual Statistics.

As an indicator of the law and contract enforcement we employ World Bank's governance indicators. They measure governance indicators in six dimensions, namely voice of accountability, political stability, government effectiveness, regulatory quality, rule of law and control of corruption. In each of these aspects the index assigns a country's rank (0-100) with higher scores corresponding to better outcomes, and low scores indicate a low ranking. We incorporated all six indicators of governance in only one variable, namely law indicator since they measure related parts of a modern institution from different perspectives, which constitute important aspects for doing business in a modern economy. That is, the law indicator is obtained by summing the above six indicators. In doing so, we also resolve the problem of multicollinearity found among these variables.

As an alternative indicator of the law we use the overall economic freedom index of the Heritage Foundation. The index comprises ten components, namely business freedom, trade freedom, fiscal freedom, government spending, monetary freedom, investment freedom, financial freedom, property rights, freedom from corruption, and labour freedom.[37] Each component of the index is scored on a 0 to 100 scale, where 100 represents the ideal score or the maximum freedom, and the overall index for a country is a simple average of its scores on the 10 component of the freedoms (Miller and Kim (2011, p.21).

We also use Polity's democracy, autocracy, and polity2 indicators published by the Centre for Systemic Peace's Polity IV project, as a measure of the law and contract enforcement. Unlike the World Bank's and the Heritage Foundation's indexes, which are only used in the cross section regression[38], we employ Polity IV institutional indicators in all data sets due to its availability during the entire period of investigation.[39] Institutionalized autocracy assigns a value in scale of 0-10 with zero representing no autocracy and 10 strong autocracy regime. Similarly the democracy indicator assigns values (0-10), with zero indicates of no democracy and 10 highest level of democracy. Polity2, is a combined score derived by subtracting the autocracy value from the democracy value; and the score ranges from +10 (full democracy) to -10 (full autocracy).

[37] The index assess the liberty of individuals to use their labour or finances without restraint and government interference, as well as it measures the extent to which an economy's openness to global investment or trade, Miller and Kim (2011, p.21).

[38] Annual Freedom index is available from 1995-; World Bank's governance data is biannual during 1996-2002 and annual from 2002-.

[39] Institutionalized autocracy may be seen as the presence of a distinctive set of political characteristics in form of restricting or suppressing competitive political participation, the process of selection of chief executives within the political elite and chief executives power exercise with few institutional constraints, Marshall, Gurr and Jaggers (2010, p.15). The democracy indicator is a composite of:

> "*One is the presence of institutions and procedures through which citizens can express effective preferences about alternative policies and leaders. Second is the existence of institutionalized constraints on the exercise of power by the executive. Third is the guarantee of civil liberties to all citizens in their daily lives and in acts of political participation*." Marshall, Gurr and Jaggers (2010, p. 14).

According to the authors, it is meant that other aspects of institutions such as the rule of law are means to or specific manifestation of these principles.

Previous empirical studies on the demand for general insurance services did not incorporate informal insurance. A possibility is to classify components of an economy to modern, (i.e., industries) and non modern sectors (i.e., agriculture).

In a seminal work Lewis (1954) used a two-sector model, namely, the industrial sector and the subsistence or agricultural sector to analyse labour supply and the interaction between these two sectors during the process of economic development. In Lewis framework, developing countries may be described as dual economies: modern industrial sector concentrated in urban areas and traditional low productivity agricultural sector in rural areas. *Kanbur and McIntosh (1987)* notes that a dual economy represents *"an economy and a society divided between the traditional sectors and the modern, capitalist sectors".* By the same token, in an article summary to Lewis's (1954) idea, Vines and Zeitlin (2008) state that

> "(d)ual *economies have asymmetric sectors, the interaction between which influences the path of development. These are typically a rural, traditional, or agricultural sector on one hand, and an urban, modern, or industrial sector on the other...., there are organizational differences between the sectors. The large, rural agricultural sector functions on traditional lines and is primarily based on subsistence; industrial production happens in a modern, market-oriented sector, located in towns and cities*."

It is widely recognised that the most significant indicator of a country's economic development is the degree of its industrialisation, Davis (1951).[40]

[40] Outreville (1999) in his comparison study on the level of financial development in several developing countries used human development index (HDI) as a measure of socio-economic development. The index is used by the United Nations Development Programme (UNDP) as measure for human development. The HDI has been defined in the UNDP (1990, p.10) report as the process of enlarging people's choices mainly in three dimensions, people's choice to live for a long and healthy life; to acquire knowledge and have necessary resources (including income) for a decent standard of livening. The index reflects indicators of life expectancy, education, and standard of living as indicated by GDP per capita. The index is available as annual index, and at five-year intervals index. We have considered the use of the annual index in our study; however, we dropped the index due to high collinearity found between the index and other explanatory variables such as GDP per capita, and life expectancy, as well as taking into account the recommendation of UNDP about the use of the five- year index. Because of data revision the UNDP recommends the use of the five-year intervals index for comparison, (Human Development Report, 2011, p.123).

The dual economy models suggest that the problem of development is the problem of transition from agrarianism to modern industrialised economy. Kuznets (1955) argues that income inequality depends on the sectoral structure of an economy. As a country develops, i.e., in the transition from agriculture to industry, Kuznets hypothesizes an inverted u-shaped relationship between income inequality and economic development. Therefore, empirical literature on infrastructure development and income distribution (see Calderon and Serven, 2004 and the references therein) includes the size of non agriculture sector (i.e., the share of industry and services) in the economy's total value added as a control variable for the size of modern sector.

Clarke, Xu and Zou (2003) suggest that the modern sector is associated with financial development. Building on Kuznets Clarke, Xu and Zou (2003) argue that the insight from Kuznets (1955) sectoral structure of an economy appears to affect financial intermediaries' development. They hypothesise a positive interaction between financial depth and the size of the modern sector as characterized by industry and services sectors. Therefore, they include a variable representing the share of value-added accounted for by services and industry (as opposed to agriculture).[41] Similarly, Batuo, Guidi and Mlambo (2010) empirical panel study on financial development and income inequality also include the share of non-agricultural value added in GDP as an explanatory variable.

Ranis (2006) indicates the relevance of Lewis model of dualism to the analysis of insurance. Millo and Carmeci (2011) use the sectoral approach to proxy for different

[41] Clarke, Xu and Zou (2003) analyse whether financial intermediary development has an impact on income inequality and whether this impact depends on the level of financial intermediary development or the sectoral structure of the economy using a panel of data set of 91 countries over the period 1960-95. They find that in line with the prediction of Kuznets's hypothesis, the relation between the Gini coefficient and financial intermediary development depend on the sectoral structure of the economy, i.e., agricultural and non-agricultural (modern sector. A large modern sector is associated with a smaller drop in the Gini coefficient for the same level of financial intermediary development, and no evidence for an inverted U shaped relation between financial sector development and income inequality.

insurance coverage need. They assess the determinants of non-life insurance consumption across 103 Italian provinces in 1998–2002. They note that regional insurance consumption variation remained relatively stable since the early 1990s and that both insurance density and penetration are much lower in the Southern part of Italy than in the north. They include a number of control variables in order to account for socioeconomic characteristics, among other things, the share of agricultural value added in order to control for the diverse composition of the productive sector, possibly leading to variability in insurance needs. Millo and Carmeci (2011) find the variable negative and statistically significant.[42]

Nevertheless, they did not discuss why people in agriculture need or use less formal insurance. A plausible explanation is that agricultural societies use to some extent traditional/informal risk sharing institutions.[43] In other words, the more agricultural a society is the more likely is the pervasiveness of informal risk sharing institutions. And since our interest is in finding a proxy for the size of informal institutions in a country the study uses the share of agriculture in a country's GDP. The more agricultural contribution to GDP's value added is, the more likely is informal risk sharing institutions prevail and vice versa. Data on agriculture value added are from WDI and United Nations Statistics Division (UNSD).

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[42] Esposti (2007) applied the model to analyse agricultural decline in Italian regions during the 1951-2002 period. He argues that although Italy experienced industrial development in the post WWII period, the country's 20 regions showed very diverse initial conditions from already industrialised Northern regions to agrarian Southern ones, and these large disparities did not vanish. He indicates that "(o)bserving the 20 Italian regions over the 50 years between the WWII and the new century, we can thus observe both cases similar to the currently developing countries (Italian Southern regions in early '50s) and cases analogous to currently most developed countries (Italian Northern regions in recent years)."p.4. Such regional differences may also be noticed in that while in the north often only the nuclear family lives together; in the south, the extended family often resides together in one house.

[43] Swaminathan (1991, pp.1-3) indicates that the term "informal sector" can be traced to the '50s and '60s studies on the dualistic nature of developing economies. As the informal sector includes activities that are excluded or ignored in national accounts, Peattie (1987) suggests that the term informal sector can be traced to both the tradition of economic accounting and that of dualism. Indeed, although the two sector model often applied to developing countries, whereby agriculture constitutes an important sector in the economy.

As an alternative indicator of informal institutions we use the size of the informal/shadow economy computed by Schneider, Buehn, and Montenegro (2010).[44] The indicator is only used in the cross section regression as the data does not cover the entire period of the study.

Data on general insurance premiums (premiums /GDP) is obtained from Beck, Demirguc-Kunt & Levine (2000), and different issues of Swiss Reinsurance's Sigma. In order to compute general insurance consumption per capita we use data on population and GDP per capita from WDI.

As financial development in a country enhances the demand motivated by transaction costs, we use the level of financial development as a proxy for the demand motivated by transaction costs. As a measure of financial development, Outreville (1990) used the ratio of M2 (broad money) to GDP, alternative the ratio of currency and demand deposit MI to M2. However, a broader measure of the overall size of the financial system in a country is the ratio of liquid liability to GDP, Beck, Demirgüç-Kunt and Levine (2000). Therefore, in this chapter we use liquid liability as an indicator of transaction costs/financial development. Data on liquid liability[45]

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[44] There is no consensus on a definition of informal economy. For instances, the Fifteenth International Conference of Labour Statisticians (ILO) in 1993 adopted the following definition (as reported in ILO 2002, p.11) :

> "*The informal sector is regarded as a group of household enterprises or unincorporated enterprises owned by households that includes:*
> *• informal own-account enterprises, which may employ contributing family workers and employees on an occasional basis; and*
> *• enterprises of informal employers, which employ one or more employees on a continuous basis. The enterprise of informal employers must fulfil one or both of the following criteria: size of unit below a specified level of employment, and non-registration of the enterprise or its employees*."

However, Schneider, Buehn, and Montenegro (2010, p.5) adopted the following definition of the shadow economy:

> " *the shadow economy includes all market-based legal production of goods and services that are deliberately concealed from public authorities for any of the following reasons: to avoid payment of income, value added or other taxes, (2) to avoid payment of social security contributions, (3) to avoid having to meet certain legal labour market standards, such as minimum wages, maximum working hours, safety standards, etc., and (4) to avoid complying with certain administrative procedures, such as completing statistical questionnaires or other administrative forms*."

[45] WDI's definition is that "*Liquid liabilities are also known as M3. They are the sum of currency and deposits in the central bank (M0), plus transferable deposits and electronic currency (M1), plus time and savings deposits, foreign currency transferable deposits, certificates of deposit, and securities repurchase agreements (M2), plus travellers checks, foreign currency time deposits, commercial paper, and shares of mutual funds or market funds held by residents.*"Source: International Monetary Fund, International Financial Statistics and data files, and World Bank and OECD GDP estimates.

expressed as a percentage of GDP obtained from WDI, and Beck, Demirgüç-Kunt and Levine (2000).

In this chapter we utilize three data sets. A dataset1 comprises 65 industrialized and developing economies for the year 2000, and utilize produced capital per capita as a measure/proxy for wealth. Availability of data on produced capital that mainly limits the number of countries included in the sample. The dataset is used in the cross section regression. An attempt, here, is made to employ different proxies to estimate the parameters of the determinants of the demand for general insurance.

Another unbalanced full dataset2 includes 99 industrialized and developing economies over the period 1987-2009 utilizes GDP per capita as a measure/indicator of wealth and is used to investigate the long run relationship between the demand for general insurance services and its determinants.

In order to conduct factor and spatial diagnostic tests that require balanced data and study spatial interdependencies of insurance consumption[46] we use, out of the full dataset, a balanced dataset3 that contains 54 developed and emerging economies over the period 1992-2005. Choice of the economies and years were merely based on availability of observations for all variables, or almost for all variables. Remaining gaps in the data were filled using an average value for adjacent years.[47]

Datasets 1, 2 and 3 are summarized in Tables 2-1A, 2-1C and 2-1E, respectively. That is, Table 2-1A displays descriptive statistics for dataset1 for 65 countries and the year 2000. Table 2-1C shows descriptive statistics for dataset 2 of 99 countries

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Notably, there is no consensus in the empirical literature on a measure of financial development. Outreville (1990) states that "(m)*easurement of financial development seems controversial because countries differ in their institutional environment and have different financial structures according to their development stage*.", pp.492-493.

[46] Available tools for spatial analysis (in Stata) require balanced data.

[47] For instance if a value of a variable in 1996 is missing but there are values of the variable in 1995 and 1997, then the value given to the variable in 1996 is the average of the values of the variable in 1997 and 1995. The missing values are mainly in educational indicators. The missing values/or gaps in insurance premiums were amounted to seven in the entire period and the whole sample, followed by nine gaps in liquid liability. There were no gaps in other variables.

over the period 1987-2009. Table 2-1E provides descriptive statistics for dataset 3, a balanced dataset of 54 countries over the period 1992-2005. The tables also provide the definition, label and source of all key variables, units of measurement, means, standard deviations (overall, between and within countries), and minimum and maximum values. The summary statistics show that there is variation between and within countries, justifying the use of panel estimation techniques.

Moreover, correlation matrices for datasets 1, 2, and 3 are presented in Table 2-1B, Table 2-1D, and Table 2-1F, respectively. The signs of the correlation coefficients between the dependent and independent variables are statically significant at least at 5 percent level of significance and, with the exception of autocracy, consistent with hypothesised relations between general insurance premiums and the independent variables.

2.5. Estimation Results and Analysis

2.5.1. OLS Regression Results

Estimation results are presented in Table 2-2. While regressions 1-9 utilize general insurance density as the dependent variable regressions 10-18 utilize general insurance penetration as the dependent variable. For the purpose of comparison with previous studies, the discussion will focus on results where general insurance density is the dependent variable. The results show that produced capital is positive and significant in all regressions, which is in line with the findings of Nakata and Sawada (2007).[48] Nevertheless, the coefficient of produced capital per capita varies depending on whether the demand for general insurance depends on produced capital

[48] Note that we use produced capital and GDP per capita as alternative indicators of wealth. This diverges from Browne, Chung, and Frees (2000) who used income together with wealth in the cross regression and reported a negative relationship between wealth and nonlife insurance consumption.

only, or also includes other variables. The results show that if we use produced capital only as an explanatory variable, then wealth elasticity is greater than unity and is close to those reported in previous work, namely, Dickinson, and Khajuria (1988) and Outreville (1990), though these studies did not use produced capital per capita and instead they used GDP per capita. It suggests that general insurance is a luxury/superior service. However, when we include other explanatory variables the results suggest that income elasticity is less than unity, which suggests that general insurance is a necessity service. Notably, the adjusted R-squared, the coefficient of determination of the multivariate models dominate the univariate model, which lends support to the hypothesis that general insurance consumption depends on more than income per capita, and income elasticity is likely to be less than unity.

The three alternative indicators of the law, namely democracy, governance indicator and the index of economic freedom are statistically significant and have the expected positive sign.[49] It suggests that the law have a positive impact on the demand for general insurance services. The results are consistent with the findings of Browne, Chung, and Frees (2000), Esho et al (2004) and Nakata and Sawada (2007).

The two indicators of informal institutions, namely agriculture value added and the informal economy are statistically insignificant. It suggests that general insurance consumption variation across countries cannot be explained by socioeconomic development.

The indicator of infrastructural development, namely telephone mainlines is statistically significant and has the expected positive sign. It shows that, infrastructural development in a country has a positive impact on general insurance consumption. It indicates that infrastructural development is important for insurers'

[49] We have also experimented with the other Polity's two institutional indicators, namely autocracy and polity2 and they were statistically insignificant. The results are not reported here.

ability to provide cost effective insurance service, which increases the demand for insurance.

The indicator of risk aversion (gross secondary enrolment) is weakly statistically significant and has a negative sign, while the expected one is positive. Probability of loss indicator (urbanization) is weakly significant. By contrast, gross tertiary enrolment indicator is insignificant.

Transaction costs/financial development indicator is statistically insignificant in all regressions, which suggests that the demand for insurance motivated by transaction costs cannot explain general insurance consumption variation across countries.

All in all, the results from the multivariate regressions indicate that in addition to wealth per capita, the law and infrastructural development are statistically significant. Risk aversion indicator is weakly significant and has a negative sign. Probability of loss is also weakly significant. Transaction costs/financial development and informal institutions are insignificant.

Estimation results, using general insurance penetration as the dependent variable suggest that infrastructural development indicator; the law indicators are statically significant with positive sign. Probability of loss indicator is weakly significant with positive sign. Risk aversion indicators (secondary enrolment ratio) is weakly significant with a negative sign. The results indicate that produced capital is positive and statistically significant when it is the only explanatory variable and that the wealth elasticity is less than unity. In contrast, in the multivariate models, i.e., when other explanatory variables are added to the demand equation, the proxy for wealth in most specifications is insignificant. The coefficient of determination, the adjusted R-squared, indicates that multivariate models dominate the univariate model.

Therefore, one tends to suggest that wealth is weakly significant and negatively related to general insurance consumption.

Although OLS estimator does not take into account country specific effects, omitted variables (e.g., losses), and the cross section results may be subjected to selection year bias[50] as in other studies, it serves as a baseline and to make comparison with existing empirical work on general insurance. In contrast, a panel data analysis overcomes these shortcomings and provides efficient estimates. Panel estimation results are presented in section 2.5.5.

2.5.2. Cross Section Dependence in the Data

In order to test for cross section dependence we utilize Cross-section Dependence Lagrange Multiplier (CD_{LM}) test suggested by Frees (1995) and Pesaran Cross section Dependence (CDρ) test. As the dataset2 of 99 countries over the period 1987-2009 is unbalanced, it was not possible to conduct the test for all variables. Therefore, in order to investigate the presence of cross section dependence in all variables we utilize the balanced dataset of 54 developed and emerging economies over the period 1992-2005. Table 2-3 displays the average correlation coefficient of variables in the first difference regressed on a country specific intercept.

The test suggests the presence of cross section dependence in all variables. Both Pesaran CDρ test and CD_{LM} reject the null hypothesis of cross section independence. The results suggest that the presence of cross-section correlation between pairs of countries for general insurance density, general insurance penetration, GDP per

[50] We used a one year OLS cross section regression for the purpose of comparison with previous studies. In another data set that contains produced capital per capita as a measure/proxy for wealth for 74 developing and developed countries over the years 1995, 2000, 2005 and nonoverlapping five years average for all other variables during 1995-2009 we employed pooled cross section analysis and the results, which are not reported here, show that wealth elasticity is less than unity and that nonlife insurance density is positively related to infrastructural development, urbanisation, institutional quality; and negatively related to informal institutions.

capita, telephone mainlines, agriculture value added, education, urbanization and liquid liability.[51] Average correlation varies between variables from 0.642 in urbanization and 0.416 in telephone mainlines, to 0.306 in income per capita and 0.243 in insurance density.

By the same token, the Moran's I test rejects the null hypothesis of global spatial cross section independence. The Moran's I test was computed on variables in levels.[52] The test indicates the presence of spatial cross section dependence in all variables but not general insurance penetration and liquid liability.

2.5.3. Nonstationarity of General Insurance Indicators and Its Determinants

We conducted two diagnostic tests for the presence of unit root in panel dataset 2, namely Fisher-type unit root test for panel, the Maddala- and Wu- Phillips-Perron (PP) test and Pesaran (2007) unit root test for heterogeneous panel data (CIPS). The latter test accounts for possible cross-section dependence in the data. However, the Maddala- and Wu- Phillips-Perron Fisher test assumes cross section independence in the data. As we have found indications for the presence of cross section dependence in the data, the Maddala- and Wu- Phillips-Perron Fisher test is computed for comparison, and the analysis is based on the CIPS test results.

The results of Maddala- and Wu- Phillips-Perron unit root test are presented in Table 2-4. It shows that agriculture value added, urbanization, democracy, and autocracy, are stationary in levels and first difference. In contrast, Liquid liability, nonlife density, nonlife penetration, GDP per capita, telephone mainlines, and educational indicators, are nonstationary in levels and stationary in first difference.

[51] The test did not provide results for autocracy, democracy and polity2.
[52] The test did not provide results for the variables in first difference.

Table 2-5 reports the results of Pesaran's CIPS test. The test shows that for GDP per capita, nonlife density, nonlife penetration, liquid liability, telephone mainlines, educational indicators, urbanization, autocracy, and democracy in levels we cannot reject the null hypothesis of nonstationarity. The CIPS results show that agriculture value added is stationary with an intercept only, and nonstationary with an intercept and a linear trend. The CIPS test results show that all variables in the first difference are stationary.

To sum up, CIPS test results show nonstationarity of most variables in levels, and stationarity in the first difference. This may suggest the need for cointegration test to assess that the relationship between the demand for nonlife insurance and hypothesised determinants is not spurious.

2.5.4. Cointegration Analysis

The possibility of cointegration between nonlife insurance demand indicators and its determinants in general, and between insurance demand indicators and GDP per capita in particular is investigated using the Kao (1999) test and $CADFC_p$ test advanced by Banerjee and Carrion-i-Silvestre (2011).

Although the CIPS panel unit root test results using the whole data set show nonstationarity of most variables in levels, including the dependent variable, on the one hand, and cointegrating relationship can also exist in the presence of a mix of I (1) and I (0) variables in the model, (Asterious and Hall, 2007, p.322; Charemza and Deadman, 1997; p.126) on the other hand, we conducted individual unit root test using the Phillips-Perron unit root test before testing for cointegration.[53] Countries for which individual unit root test indicates sationarity of either nonlife insurance demand indicators or GDP per capita were discarded.[54] The result was a sample 46 countries for which both nonlife insurance demand indicators and GDP per capita are non stationary. The CIPS panel unit root test results for the 46 countries are displayed in Table 2-6. It shows that all variables[55] are nonstationary in levels and stationary in first difference.

As the Kao test for cointegartion assumes cross section independence, the data was demeaned, detrended, detrended and demeaned before applying the Kao test. The purpose of data demeaning or detrending is to remove possible cross section dependence in the data. In contrast, the $CADFC_p$ test was carried on original data. The results of both tests are displayed in Table 2-7. Both tests show that there is a conitegrating relationship between nonlife density and GDP per capita, nonlife penetration and GDP per capita, nonlife density and its determinants, nonlife penetration and its determinants. It implies that there is a long run relationship between general insurance consumption and its determinants, including GDP per capita.[56] The result invalidates Nakata and Sawada's (2007) assertion that the relationship between general insurance consumption and GDP per capita is spurious. Estimation and discussion of the long run relationship is presented in section 2.5.6 using the CCEP approach.

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[53] This is a precautionary measure as Karlsson and Löthgren (2000, p.249) using Monte Carlo simulation found that "panel unit root tests can have high power when a small fraction of the series is stationary" and vice versa.

[54] For some countries both nonlife insurance indicators and GDP per capita were stationary. For some other countries either GDP per capita or nonlife insurance indicators were found stationary. Countries with small sample of observation or gaps were also discarded, as the CIPS test seems to require at least 4 consecutive observations. For democracy and autocracy indicators we excluded countries from the unit root test for which the score was constant during the entire period of investigation.

[55] for which the test was possible to conduct. For democracy in first difference the test does not provide result

[56] We have also conducted the Maddala and WU Johansson cointegration test. The results were qualitatively similar and are not reported here.

2.5.5. Error Correction Model

As we have established the long-run relationship between the indicators of the demand for general insurance and its determinants, we now turn to the estimation of the following error correction model:[57]

$$\Delta q_{it} = \alpha_i + \phi_i (q_{i,t-1} - \hat{\beta} X_{t,t-1}) + \sum_{j=1}^{p} \varphi_{ij} \Delta q_{i,t-j} + \sum_{j=1}^{p} \gamma_{ij} \Delta X_{i,t-j} + \varepsilon_{it} \tag{2.13}$$

where Δ denotes the first difference operator, in the parenthesis we have the previous period's error term, and p is number of lags. The coefficient ϕ_i measures the speed of adjustment of general insurance penetration/density to a deviation from the long-run equilibrium relation between general insurance consumption and its determinants. In estimating equation (2.13) we have used the CCEP error terms and the CCEP method and the dataset of 46 countries over the period 1987-2009.[58] In estimating the CCEP, unobserved factors were approximated by $\Delta\bar{q}_t, \Delta\bar{q}_{t-1}, \Delta\overline{\mathrm{X}}_{t\text{-}1}$ and $\bar{q}_{t-1} - \hat{\beta}\overline{X}_{t-1}$, where $\hat{\beta}$ are the estimated coefficients in all regressions.

Table 2-8 displays CCEP estimation results of the error correction model using 4 lags of the residuals, and all other differenced variables. Specifications 1-4 are multivariate ones, i.e. insurance density/penetration as the dependent variable and several explanatory variables. In contrast, specifications 5-6 are bivariate ones, i, e., general insurance penetration/density as the dependent variable, and GDP per capita as the independent variable. Generally the error correction term is significant and has the expected negative sign suggesting that deviations from equilibrium are corrected in future time periods. When general insurance density is the dependent variable, general insurance density in prior periods is significant towards the dynamic

[57] Note that we do not assume a one-way correction to the long-run equilibrium; we are only interested in uncovering the dynamics of nonlife premiums and its determinants.
[58] It is the same data set used for cointegration test.

adjustment. Similarly, when general insurance penetration is the dependent variable, general insurance penetration, and GDP per capita, in prior periods are significant towards the dynamic adjustment.

2.5.6. Panel Estimation Results

Estimation results of the Fixed Effects (FE) model[59] and the Common Correlated Effects Pooled (CCEP) are presented in Table 2-9. For the purpose of comparison with previous studies, the discussion focuses on results from models where the dependent variable is general insurance density. Estimation results of the fixed effects are 1-7. When insurance consumption depends on income per capita only, income elasticity is greater than unity. However, the results of the multivariate models suggest that the elasticity is approximately one or less than unity. In the multivariate models, indicators of transaction cots/financial development, risk aversion, infrastructural development, informal institutions, and autocracy are significant and have the expected positive sign. However, as the fixed effect is biased and inconsistent in the presence of unobserved common factors we will focus on the CCEP estimation.

The results of CCEP 15-21 utilize insurance consumption per capita as the dependent variable. It suggests a positive relationship between general insurance consumption and GDP per capita, which is in line with Wasow (1986), Beenstock, Dickinson, and Khajuria (1988), Outreville (1990), Browne, Chung, and Frees (2000), Esho et al (2004), Nakata and Sawada (2007), and Park and Lemaire (2011). When the demand function depends on GDP per capita only, income elasticity is

[59] The summary statistics show that there is variation between and within countries, justifying the use of panel estimation methods. We tried with both Fixed Effects and Random Effects and used the Hausman test, which is not reported here. The test indicated that the FE estimators are consistent and efficient, and hence the use of the FE model. The FE accounts for specific country effects.

1.325, which is greater than unity and is close to the elasticity reported by Dickinson, and Khajuria (1988) and Outreville (1990). It suggests that an increase of 1% in GDP per capita would imply an expected increase in insurance consumption by 1.3%, other things held constant. However, in the multiple regressions income elasticity of 0.775 is less than unity, which suggests that general insurance service may be classified as a necessity service. In this case a 1% increase in GDP per capita would imply an expected increase of 0.775% in insurance consumption, other things held constant.

Informal institutions indicator (agriculture value added) is statistically significant in all specifications and negatively related to general insurance consumption, which suggests that less general consumption in countries where informal institutions are used. In other words, the result suggests that informal risk sharing mechanisms are substitute for formal insurance. The panel results are in contrast to the simple OLS regression results, which suggest insignificance of informal institutions.

The law indicator (autocracy) is significant and positively related to general insurance consumption. Higher institutional quality will induce general insurance consumption. The result is consistent with the findings of Esho et al (2004) and Nakata and Sawada (2007). The positive effect of the law on insurance consumption may be attributable to compulsory insurance coverage, and contract enforcement and property rights.

Risk aversion indicator (education 3rd level) is significant and positively related to insurance consumption in all specifications. Higher education will induce people to purchase insurance coverage as they will be aware of the risk (Outreville, 1990, p.494; and Browne and Kim, 1993, p.624). The alternative risk aversion indicator (gross secondary enrolment ratio) is insignificant in all specifications. The panel result is in contrast to the OLS regression result that suggests a negative and weak significance of the coefficient of gross secondary enrolment ratio, and insignificance of gross tertiary enrolment indicator.

Infrastructural development (telephone mainlines) is positive and significant in all specifications, which suggests that the higher the level of infrastructural development the more general insurance consumption is. A plausible explanation is that the more infrastructural development in a country is, the less the cost of insurance is.

Transaction costs/financial development (liquid liability) is weakly significant and positively related to general insurance consumption. The finding is consistent with Outreville (1990). It suggests a positive demand for general insurance coverage motivated by transaction costs.

Probability of loss indicator (urbanization) and alternative law indicators (democracy, and polity2) are all insignificant.

By contrast, the CCEP estimation results 22-28 utilise general insurance penetration as the dependent variable. When insurance penetration depends on GDP per capita only, income is significant and income elasticity is less than unity. However, in the multivariate models income is either insignificant or significant with negative sign, which does not exclude the possibility that general insurance service may be an inferior service. For other variables the results are in line with the results obtained using general insurance density as the dependent variable. Informal institutions, infrastructural development (telephone mainlines), risk aversion (gross tertiary education), and law indicator (autocracy) are statistically significant with the expected positive sign. Liquid liability is weakly significant. Probability of loss (urbanization), alternative law indicators (democracy, and polity2) and alternative risk aversion indicator (gross secondary enrolment) are all insignificant

To sum up, the results show that general insurance consumption is positively related to GDP per capita, the law, transaction costs, infrastructural development, and risk aversion; and negatively related to socio economic development. However, probability of loss is insignificant.

2.6. Summary and Conclusions

Using three international data sets, this chapter investigates the relationship between consumption of general insurance services and per capita income/wealth, controlling for possible factors that derive the demand for general insurance services.

We employed cross section regression analysis using a dataset of 65 developed and developing countries for the year 2000 and using produced capital as an indicator of wealth. Estimation results suggest that, controlling for possible determinants, wealth elasticity with respect to general insurance services is less than unity. However, without controlling for other determinants, we obtained wealth elasticity greater than unity close to previous studies, the basis for the widely cited explanation for why insurance being perceived as a luxury service.

In order to investigate the presence of spatial cross section dependence in the data we used a balanced dataset of 54 developed and emerging economies over the period 1992-2005. Both Cross section Dependence Lagrange Multiplier (CD_{LM}) test suggested by Frees (1995) and Pesaran Cross section Dependence (CD_{ρ}) test statistics suggest the presence of cross section dependence in the data. The Moran's I test for spatial cross section dependence also suggests the presence of spatial dependence in the data.

Next, using an unbalanced data set of 99 countries over the period 1987-2009 we employed panel data analysis to study the long run economic relationship between per capita consumption of insurance services and per capita income.

We investigated time series properties of the data using the Pesaran (2007) unit root test for heterogeneous panel data (CIPS). Test results suggest nonstationarity of several variables in levels and stationarity in the first difference.

Moreover, using a sample of 46 countries, the Kao (1999) test, and $CADFC_p$ test advanced by Banerjee and Carrion-i-Silvestre (2011) we investigated cointegration between general insurance demand indicators and its determinants including GDP per capita. Test results suggest that the presence of a long run relationship between general insurance consumption and GDP per capita, general insurance consumption its determinants including GDP per capita.

We also investigated the dynamic adjustment of the demand for general insurance services and its determinants to long-run equilibrium using error correction model. The CCEP estimation results suggest that the error correction parameter is significant and has the expected negative sign.

We employed the Common Correlated Effects Pooled estimator advanced by Pesaran (2006) and results suggest that income elasticity is less than unity and that informal institutions, the law, risk aversion and infrastructural development are statistically significant. Although for the sake of comparison we employed the fixed effects estimator, the discussion and conclusions of the chapter are based on the CCEP method as the fixed effects estimator is biased and inconsistent in the presence of cross-sectional dependence caused by unobserved common factors in the data, (see De Hoyos and Sarafadis, 2006).

All in all, income elasticity with respect to general insurance services is likely to be less than unity and that the relationship between per capita income and per capita consumption of general insurance services is not spurious. The chapter also sheds light in the importance of incorporating informal insurance institutions in the analysis of the demand for general insurance services.

Appendix B

In this appendix we present the statistical tests used in the work

Unit Roots Tests

Consider the k^{th} order augmented Dickey Fuller regression

$$\Delta q_{it} = \alpha_i + b_i q_{i,t-1} + c_i t + \sum_{j=1}^{k} d_{ij} \Delta q_{i,t-j} + \varepsilon_{it}$$

where q_{it} is defined as the logarithmic of insurance density, the logarithmic/level (as used in the estimation) of the j^{th} explanatory variables, or the residuals from regression (2.9). The null hypothesis of unit root can be stated as follows:

$$H_0 : b_i = 0,\ i = 1, \ldots, N$$

against the alternative hypothesis

$$H_1 :\ b_i < 0, i = 1, \ldots, N\ ;$$

$$b_i = 0, i = N_1 + 1, \ldots, N,$$

where N_1 is such that $\frac{N_1}{N} \rightarrow p(\neq 0)$, $N \rightarrow \infty$

To test the null against the alternative, Pesaran (2007) proposes a cross-sectionally augmented version of the Im, Pesaran and Shin (2003) (IPS) test (CIPS), namely

$$CIPS = \frac{1}{N} \sum_{i=1}^{N} \tilde{t}_i$$

where $\tilde{t}_i$ is the OLS t-ratio of the coefficient b_i of the cross sectionally augmented Dikey-Fuller regression, namely $\Delta q_{it} = \alpha_i + b_i q_{i,t-1} + c_i t + \sum_{j=1}^{k} d_{ij} \Delta q_{i,t-1} + g_i' \overline{W}_t + e_{it}$

where $\overline{W}_t = (\bar{q}_{t-1}, \Delta\bar{q}_t, \Delta\bar{q}_{t-1}, \ldots, \Delta\bar{q}_{t-k})'$. Pesaran suggests that augmenting the augmented Dickey-Fuller regression with lagged cross-sectional average and its first difference captures the cross-sectional dependence as modelled in (2.11). Pesaran

(2007) provides critical values for the proposed test. Although the test is designed to be used when the variable has a factor structure, Baltagi et al (2007) suggest that the test is also robust to the presence of autoregressive spatial process.

A second panel unit root test we have used in the empirical work is the Fisher type test (1958). Fisher's test is based on the sum of log-p values π_i from the different tests, i.e., $-2\sum\log\pi_i \sim \chi^2$ with 2N degree of freedom, where N is the number of separate samples (Maddala, and Wu, 1999). They indicate that the Fisher test can be carried out for any unit root test and does not require balanced panel data. In the empirical work we have utilized the Phillips and Perron (PP) (1988) unit roots test. The PP test corrects the test statistics to account for any serial dependence and heteroskedasticity in the errors of the test regression. The regression for the PP test is

$\Delta q_t = b'd_t + cq_{t-1} + e_t$

Cross Section Dependence Tests

We use the average pairwise correlation coefficient test suggested by Frees (1995). The test aims at conveying the overall cross-section dependence in the data.

$$\bar{\rho} = \frac{2}{N(N-1)} \sum_{i=1}^{N-1} \sum_{j=i+1}^{N} \rho_{it} \quad \text{where } \rho_{it} \text{ is equal to } \left(\frac{\sum_{t=1}^{T} s_{it} s_{it}}{\left(\sum_{t=1}^{T} s_{it}^2\right)^{1/2} \left(\sum_{t=1}^{T} s_{jt}^2\right)^{1/2}} \right)$$

and s_{it} are the residuals from (2.9).

We also use two diagnostic tests of cross-section dependence related to the average correlation coefficient. The Pesaran (2004) CD_ρ test for unbalanced panel data is given by

$$CD_{\rho} = \sqrt{\frac{2}{N(N-1)}} \sum_{i=1}^{N-1} \sum_{j=i+1}^{N} \sqrt{T_{ij}}\, \hat{\rho}_{ij}$$

and the CD_{LM} suggested by Frees (1995), which is: the scaled version of the Breusch and Pagan LM test to be used in large N and T, Pesaran, Ullah and Yamagata (2008) and given by:

$$CD_{LM} = \sqrt{\frac{1}{N(N-1)}} \sum_{i=1}^{N-1} \sum_{j=i+1}^{N} (T\rho_{it}^{2} - 1),$$

Under the null hypothesis of no cross section dependence, the CD_{LM} approaches to a N (0, 1) with T→∞ first and then N→∞

Appendix C

Table 2- 1 Summary of Hypotheses for Nonlife Insurance Consumption

Variables/Hypotheses	Proxies	Partial expected effect on general insurance		Total Expected effect on general insurance consumption
Wealth	Produced capital /GDP per capita	Risk aversion decreases as wealth increases	-ve	ambiguous
		More wealth to insure	+ve	
Risk aversion	Secondary enrolment ratio/ tertiary enrolment ratio	NPA		positive
Infrastructural development	Telephone mainlines	NPA		positive
Probability of loss	Urbanisation	NPA		positive
Transactions costs/Financial development	Liquid liability	NPA		positive
The Law	Governance/Index of freedom/ Democracy/Autocracy/Polity2	NPA		positive
Socioeconomic development/Informal financial institutions	Agriculture value added/ Informal economy	Substitute	-ve	ambiguous
		complementary	+ve	

NPA=No prior assumption

Table 2-1 A : Summary Statistics for Dataset 1 for the Year 2000 and 65 Countries

Variable	Label	Source	Measure of/Proxy for	Obs.	Mean	Std. Dev.	Min	Max
(premiums/GDP)*(GDP)/ (total produced capital)	nonlifpenc	Premiums: Beck, Demirguc-Kunt, & Levine (2000), and Swiss Re, GDP:WDI, total produced capital: the World Bank	Insurance penetration with respect to produced capital	65	0.0080234	0.005865	0.00093	0.030129
(Premiums/GDP)*GDP/Population)	nonlifden	Beck,Demirguc-Kunt,& Levine (2000),and Swiss Re/WBI	Insurance density	65	329.7789	435.2381	1.952166	1824.63
per capita produced capital (US$ 2000)	procpc	The World Bank	Wealth	65	31452.62	33513.42	667.4512	150258.1
Liquid liability	liql	WDI and Beck,Demirguc-Kunt,& Levine (2000)	Transaction costs	64	70.69715	51.07565	17.37522	292.3373
Agriculture value added % of GDP (Agriculture, hunting, forestry, fishing)	agva	UN Statistics	Informal risk sharing institutions	65	7.587617	6.839682	0.0669	32.79305
Size of the Shadow Economy	infec	Schneider, Buehn and. Montenegro (2010)	Informal risk sharing institutions	65	27.51077	13.21737	8.6	64.1
Gross secondary education enrolment ratio	sches	WDI and UNESCO annual statistics	Risk aversion	58	88.12961	26.97628	24.8633	161.7809
Gross tertiary education enrolment ratio	schet	WDI and UNESCO annual statistics	Risk aversion	50	39.4604	21.30746	2.74002	82.79375
Telephone mainlines per (100)	tel	WDI	Infrastructural development	65	31.68968	22.60454	0.443258	72.87822
Urbanisation (as %)	urbanp	WDI	Probability of loss	65	66.35385	20.29372	10.8	100
Governance indicators (0-100)	insq	World Bank	The law	64	385.8125	152.2097	88	596
democracy	dem	Polity IV Project, Monty G. Marshall and Keith Jaggers	The law	62	7.419355	3.336575	0	10
autocracy	autoc	Polity IV Project, Monty G. Marshall and Keith Jaggers	The law	62	0.8064516	1.818292	0	7
Polity2	polity2	Polity IV Project, Monty G. Marshall and Keith Jaggers	The law	62	6.693548	4.890904	-7	10
Index of economic freedom overall	efov	The Heritage Foundation	The law	65	65.13692	9.516032	36.1	89.5

Countries, N 65: Algeria, Argentina, Australia, Austria, Belgium, Brazil, Bulgaria, Canada, Chile, China, Colombia, Costa Rica, Denmark, Dominican Republic, Ecuador, Egypt, El Salvador, Finland, France, Hong Kong, Hungary, Iceland, India Indonesia, Iran, Ireland, Israel, Italy, Japan, Jordan, Kenya, South Korea, Latvia, Luxembourg, Malaysia, Mauritius, Mexico, Morocco, Netherlands, New Zealand, Nigeria, Norway, Pakistan, Panama, Peru, Philippines, Portugal, Romania, Russia, Singapore, South Africa, Spain, Sri Lanka, Sweden, Switzerland, Thailand, Trinidad and Tobago, Tunisia, Turkey, United Kingdom, United States, Uruguay and Venezuela.

Table 2-1 B: Correlation Matrix for Dataset1 with Wealth Indicator Produced Capital

	non lifden	non lifpenc	liql	agva	infec	sches	schet	tel	urbanp	insq	dem	autoc	polity2	efov	procpc
nonlifden	1														
nonlifpenc	0.7549***	1													
liql	0.5269***	0.3303***	1												
agva	-0.5333 ***	-0.3982***	-0.3473***	1											
infec	-0.6568***	-0.4459***	-0.4347***	0.4691***	1										
sches	0.5644***	0.3435***	0.2088	-0.6782***	-0.506***	1									
schet	0.4449***	0.2781***	-0.0246	-0.536***	-0.3656***	0.7437***	1								
tel	0.8102***	0.5471***	0.387***	-0.6864***	-0.6878***	0.7794***	0.7485***	1							
urbanp	0.4336***	0.3453***	0.1765	-0.6565***	-0.3587***	0.6127***	0.571***	0.593***	1						
insq	0.7303***	0.5282***	0.4194***	-0.7262***	-0.6425***	0.7874***	0.6853***	0.8751***	0.4947***	1					
dem	0.5057***	0.458***	0.09	-0.5641***	-0.3448***	0.5481***	0.5648***	0.6235***	0.3028**	0.6776***	1				
autoc	-0.3007**	-0.3259***	0.1329	0.4478***	0.0251	-0.3689***	-0.4654***	-0.3918***	-0.3158**	-0.4028***	-0.8376***	1			
polity2	0.4447***	0.4168***	-0.0027	-0.5496***	-0.2042	0.5149***	0.5421***	0.5531***	0.3286***	0.5988***	0.9563***	-0.9506***	1		
efov	0.5014***	0.4405***	0.4599***	-0.5711***	-0.3183***	0.3984***	0.3551***	0.5322***	0.4419***	0.6323***	0.3457***	-0.2232*	0.3268**	1	
procpc	0.7988***	0.3985***	0.5216***	-0.6042***	-0.6554***	0.6404***	0.6003***	0.8358***	0.4903***	0.7413***	0.4649***	-0.265**	0.4035***	0.5351***	1

"***", "**" and "*" indicate significance at 1 percent, 5 percent and ten percent, respectively.

Table 2-1 C : Summary Statistics of Dataset 2 of 99 Countries over the Period 1987-2009

Variable	Label	Source	Measure of/Proxy for	Obs.	Mean	Overall Standard Deviation	Between Standard Deviation	Within Standard Deviation	Min	Max
premiums/GDP	nonlifpen	Beck,Demirguc-Kunt, & Levine (2000)	Insurance penetration	1747	0.020426	0.026316	0.013191	0.02311	0.001108	1
(premiums/GDP)*(per capita income (US$ 2000 constant) alternative (Premiums/GDP)*GDP/Population)	nonlifden	Beck,Demirguc-Kunt, & Levine (2000), and Swiss Re/WBI	Insurance density	1709	314.2342	808.2974	692.8786	637.8014	0.715123	29251.11
GDP and per capita income (US$ 2000 constant)	gdppc	WDI	Wealth	2190	9302.087	10494.26	10340.61	2112.054	205.0031	56624.73
Agriculture value added %of GDP (Agriculture, hunting, forestry, fishing)	agva	UN Statistics	Informal risk sharing institutions	2247	9.157852	8.163928	7.697925	2.710386	0.043394	48.56594
Liquid liability	liql	WDI and Beck,Demirguc-Kunt, & Levine (2000)	Transaction costs	2109	64.57558	46.77348	45.18334	16.0142	8.57049	478.1025
Gross secondary education enrolment ratio	sches	WDI and UNESCO annual statistics	Risk aversion	1875	78.82027	26.8581	25.04677	10.9396	10.91504	161.7809
Gross tertiary education enrolment ratio	schet	WDI and UNESCO annual statistics	Risk aversion	1656	31.90278	21.69436	18.67932	11.23735	0.561263	98.09171
Telephone mainlines per (100)	tel	WDI	Infrastructural development	2271	23.81645	19.63617	18.86573	5.692505	0.123295	74.46233
Urbanisation (as %)	urbanp	WDI	Probability of loss	2277	63.62628	20.37278	20.25738	2.941946	8.5	100
Democracy	dem	Polity IV Project, Monty G. Marshall and Keith Jaggers	The law	2089	6.198181	3.987285	3.738436	1.407797	0	10
Autocracy	autoc	Polity IV Project, Monty G. Marshall and Keith Jaggers	The law	2089	1.910483	3.091381	2.878473	1.163151	0	10
Polity2	polity2	Polity IV Project, Monty G. Marshall and Keith Jaggers	The law	2102	4.266889	6.874176	6.455561	2.423779	-10	10

Countries, N: 99, Algeria, Angola, Argentina, Australia, Austria, Bahrain, Bangladesh, Barbados, Belgium, Botswana, Brazil, Bulgaria, Cameroon, Canada, Chile, China Colombia, Costa Rica, Côte d'Ivoire, Croatia, Cyprus, Czech Republic, Denmark, Dominican Republic, Ecuador, Egypt, El Salvador, Estonia, Finland, France, Germany , Greece, Guatemala, Honduras, Hong Kong, Hungary, Iceland, India, Indonesia, Iran, Iraq, Ireland, Israel, Italy, Jamaica, Japan, Jordan, Kazakhstan, Kenya, Korea, Kuwait, Latvia, Lebanon, Libya, Lithuania, Luxembourg, Malaysia, Malta, Mauritius, Mexico, Morocco, Namibia, Netherlands, New Zealand, Nigeria, Norway Oman, Pakistan, Panama, Paraguay, Peru, Philippines, Poland, Portugal, Qatar, Romania, Russian, Saudi Arabia, Singapore, Slovak, Slovenia, South Africa, Spain, Sri Lanka, Sweden, Switzerland, Syrian, Thailand, Trinidad and Tobago, Tunisia, Turkey, Ukraine, United Arab Emirates, United Kingdom, United States, Uruguay, Venezuela, Vietnam and Zimbabwe.

Table 2-1D: Correlation Matrix for Dataset 2 of 99 Countries over the Period 1987-2009

	nonlifden	nonlifpen	gdppc	agva	liql	sches	schet	tel	urbanp	dem	autoc	polity2
nonlifden	1											
nonlifpen	0.9504***	1										
gdppc	0.4857***	0.3102***	1									
agva	-0.2819***	-0.2487***	-0.6015***	1								
liql	0.2459***	0.1298***	0.5519***	-0.3567***	1							
sches	0.2793***	0.2485***	0.6106***	-0.6813***	0.2625***	1						
schet	0.1996***	0.1891***	0.5317***	-0.4931***	0.1419***	0.7238***	1					
tel	0.3848***	0.3046***	0.8358***	-0.6422***	0.4493***	0.7712***	0.6965***	1				
urbanp	0.2475***	0.1843***	0.5502***	-0.6624***	0.2761***	0.5814***	0.4719***	0.5565***	1			
dem	0.1734***	0.1914***	0.4077***	-0.3859***	0.1378***	0.5202***	0.5233***	0.5708***	0.1857*	1		
autoc	-0.0681***	-0.1122***	-0.189***	0.187***	-0.0235	-0.3446***	-0.4125***	-0.3639*	-0.0411*	-0.8903***	1	
polity2	0.1331***	0.1622***	0.3245***	-0.3098***	0.0926***	0.4546***	0.4877***	0.4948*	0.1281***	0.9792***	-0.964***	1

"***", "**" and "*" indicate significance at 1 percent, 5 percent and ten percent respectively.

Table 2-1 B: Summary Statistics of a Balanced Dataset 3 of 54 Countries over 1992-2005

Variable	Label	Source	Measure of/ Proxy for	Obs.	Mean	Overall Standard Deviation	Between Standard Deviation	Within Standard Deviation	Min	Max
premiums/GDP	nonlifpen	Beck, Demirguc-Kunt, & Levine (2000)	Insurance penetration	756	0.0204993	0.012603	0.01232	0.003107	0.002491	0.053695
(premiums/GDP)*(per capita income (US$ 2000 constant) alternative (Premiums/GDP)*GDP/Population)	nonlifden	Beck, Demirguc-Kunt, & Levine (2000), and Swiss Re/WBI	Insurance density	756	308.9851	400.3773	394.1575	87.27496	1.65502	1868.498
GDP and per capita income (US$ 2000 constant)	gdppc	WDI	Wealth	756	10569.01	10387.26	10378.72	1425.494	326.6271	38981.91
Agriculture value added %of GDP (Agriculture, hunting, forestry, fishing)	agva	UN Statistics	Informal risk sharing institutions	756	8.733652	7.673154	7.537559	1.743777	0.674338	48.56594
Liquid liability	liql	WDI and Beck, Demirguc-Kunt, & Levine (2000)	Transaction costs	756	64.38025	35.38312	34.35652	9.587433	11.48738	243.8445
Gross secondary education enrolment ratio	sches	WDI and UNESCO annual statistics	Risk aversion	756	85.61627	27.70714	26.46661	8.903121	23.8	161.7809
Gross tertiary education enrolment ratio	schet	WDI and UNESCO annual statistics	Risk aversion	756	36.64118	21.52542	19.93786	8.524662	2.490911	97.9755
Telephone mainlines per (100)	tel	WDI	Infrastructural development	756	28.51637	21.03411	20.84507	3.924092	0.313212	74.46233
Urbanisation (as %)	urbanp	WDI	Probability of loss	756	66.11235	17.92901	17.98971	1.841763	18.52	97.3
democracy	dem	Polity IV Project, Monty G. Marshall and Keith Jaggers	The law	752	7.220745	3.620727	3.470907	1.120137	0	10
autocracy	autoc	Polity IV Project, Monty G. Marshall and Keith Jaggers	The law	752	1.222074	2.53022	2.382883	0.894147	0	10
Polity2	polity2	Polity IV Project, Monty G. Marshall and Keith Jaggers	The law	756	5.990741	5.983524	5.71154	1.934573	-10	10

Countries, N: 54 , Algeria, Argentina, Australia, Austria, Belgium, Brazil, Bulgaria, Canada, Chile, China, Colombia, Denmark, Egypt, Finland, France, Greece, Hungary, India, Indonesia, Iran, Ireland, Israel, Italy, Japan, Kenya, Korea, Malaysia, Mexico, Morocco, Netherlands, New Zealand, Nigeria, Pakistan, Panama, Peru, Philippines ,Poland, Portugal, Romania, Saudi Arabia, Slovenia, South Africa ,Spain, Sweden , Switzerland, Thailand, Tunisia, Turkey, Ukraine, United Arab Emirates, United Kingdom, United States ,Uruguay and Venezuela.

Table 2-1 F: Correlation Matrix for Balanced Dataset3 of 54 Countries over 1992-2005

	nonllifpen	nonlifden	gdppc	agva	liql	sches	schet	tel	urbanp	polity2
nonlifpen	1									
nonlifden	0.846***	1								
gdppc	0.7062***	0.9125***	1							
agva	-0.575***	-0.574***	-0.67***	1						
liql	0.3998***	0.5027***	0.5142***	-0.2981***	1					
sches	0.5984***	0.5925***	0.6586***	-0.7081***	0.224***	1				
schet	0.6393***	0.6226***	0.6477***	-0.635***	0.2204***	0.7705***	1			
tel	0.7368***	0.822***	0.8806***	-0.695***	0.4035***	0.7964***	0.7999***	1		
urbanp	0.4315***	0.4328***	0.5026***	-0.714***	-0.009	0.6212***	0.5532***	0.551***	1	
polity2	0.5076***	0.4322***	0.4018***	-0.4504***	0.1076***	0.5521***	0.5866***	0.5553***	0.3552***	1

"***", "**" and "*" indicate significance at 1 percent, 5 percent and ten percent respectively.

Table 2- 2 : OLS Regression Results Using ProCpc as Indicator of Wealth, Dataset1

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Variables	Lognonlifden	Lognonlifden	Lognonlifden	Lognonlifden	Lognonlifden	Lognonlifden	Lognonlifden	Lognonlifden	Lognonlifden
logprocpc	1.305***	0.664***	0.749***	0.609***	0.848***	0.813***	0.871***	0.738***	0.843***
	(0.0604)	(0.208)	(0.216)	(0.185)	(0.160)	(0.155)	(0.160)	(0.143)	(0.121)
liql		0.00106	0.00129	0.000862	0.000300	0.00119	0.00141	0.000609	0.000300
		(0.00174)	(0.00244)	(0.00157)	(0.00136)	(0.00182)	(0.00253)	(0.00167)	(0.00138)
agva		-0.0261	-0.0214	-0.0244	0.000830				
		(0.0249)	(0.0257)	(0.0215)	(0.0177)				
sches		-0.0104**	-0.00657	-0.00421		-0.0102*	-0.00627	-0.00372	
		(0.00512)	(0.00501)	(0.00451)		(0.00517)	(0.00505)	(0.00453)	
tel		0.0232**	0.0261***	0.0304***	0.0227***	0.0202**	0.0236**	0.0254***	0.0227***
		(0.00963)	(0.00936)	(0.00797)	(0.00659)	(0.00915)	(0.00883)	(0.00760)	(0.00689)
urbanp		0.00981*	0.00801	0.00592	0.00674*	0.0109*	0.00887	0.00739	0.00669*
		(0.00559)	(0.00578)	(0.00494)	(0.00395)	(0.00552)	(0.00571)	(0.00497)	(0.00386)
insq		0.00265**				0.00283**			
		(0.00121)				(0.00121)			
dem			0.0593*				0.0646*		
			(0.0342)				(0.0338)		
efov				0.0373***	0.0359***			0.0398***	0.0359***
				(0.00979)	(0.00799)			(0.0101)	(0.00808)
schet					-0.00702				-0.00698
					(0.00469)				(0.00474)
infec						0.00422	0.00296	-0.00343	-7.23e-05
						(0.00821)	(0.00835)	(0.00771)	(0.00702)
Constant	-8.032***	-3.152*	-3.746*	-4.511**	-6.782***	-4.960***	-5.216***	-5.969***	-6.726***
	(0.587)	(1.879)	(1.942)	(1.707)	(1.455)	(1.123)	(1.138)	(1.030)	(0.910)
Observations	65	56	55	57	49	56	55	57	49
R-squared	0.881	0.924	0.919	0.937	0.955	0.922	0.918	0.935	0.955
Adj. R-squared	0.879	0.913	0.907	0.928	0.947	0.911	0.906	0.926	0.947

Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Table 2-2 (*continued*)

	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
Variables	lognonlifpenc	lognonlifpenc	lognonlifpenc	lognonlifpenc	lognonlifpenc	lognonlifpenc	lognonlifpenc	lognonlifpenc	lognonlifpenc
logprocpc	0.303***	-0.325	-0.237	-0.378**	-0.141	-0.183	-0.120	-0.255*	-0.154
	(0.0601)	(0.207)	(0.216)	(0.186)	(0.161)	(0.154)	(0.160)	(0.143)	(0.121)
liql		0.00104	0.00123	0.000850	0.000276	0.00117	0.00134	0.000592	0.000280
		(0.00174)	(0.00244)	(0.00157)	(0.00136)	(0.00182)	(0.00254)	(0.00167)	(0.00139)
agva		-0.0250	-0.0205	-0.0234	0.00212				
		(0.0249)	(0.0258)	(0.0216)	(0.0178)				
sches		-0.0104**	-0.00658	-0.00423		-0.0103*	-0.00629	-0.00377	
		(0.00511)	(0.00502)	(0.00452)		(0.00516)	(0.00505)	(0.00454)	
tel		0.0224**	0.0257***	0.0299***	0.0223***	0.0196**	0.0233**	0.0250***	0.0225***
		(0.00961)	(0.00937)	(0.00799)	(0.00662)	(0.00913)	(0.00884)	(0.00761)	(0.00692)
urbanp		0.00962*	0.00771	0.00569	0.00654	0.0106*	0.00854	0.00712	0.00643
		(0.00558)	(0.00579)	(0.00495)	(0.00396)	(0.00550)	(0.00572)	(0.00497)	(0.00388)
insq		0.00271**				0.00288**			
		(0.00120)				(0.00121)			
dem			0.0582*				0.0632*		
			(0.0342)				(0.0339)		
efov				0.0372***	0.0362***			0.0396***	0.0361***
				(0.00980)	(0.00802)			(0.0101)	(0.00811)
schet					-0.00699				-0.00691
					(0.00471)				(0.00476)
infec						0.00413	0.00283	-0.00351	-0.000134
						(0.00820)	(0.00835)	(0.00771)	(0.00705)
Constant	-8.010***	-3.242*	-3.835*	-4.597***	-6.883***	-4.974***	-5.243***	-5.986***	-6.742***
	(0.585)	(1.876)	(1.945)	(1.710)	(1.461)	(1.121)	(1.139)	(1.030)	(0.913)
Observations	65	56	55	57	49	56	55	57	49
R-squared	0.287	0.523	0.476	0.595	0.666	0.516	0.470	0.587	0.666
Adj. R-squared	0.276	0.454	0.398	0.537	0.609	0.445	0.392	0.528	0.608

Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Table 2- 3: Results of Cross Section Dependence Tests

Variable	Moran's I, z	Variable	ρ	CDρ, Pesaran	CD_{LM} ,Frees
agva	1.82**	Δagva	0.247	7.01***	0.469***
tel	1.892**	Δtel	0.416	19.866***	8.412***
schet	2.15**	Δliql	0.257	4.73***	0.547***
sches	3.753***	Δloglifpen	0.26	15.068***	0.977***
liql	0.926	Δloglifden	0.243	7.739***	0.257***
loggdppc	2.972***	Δloggdppc	0.306	20.667***	3.276***
lognonlifpen	1.116	Δsches	0.279	3.853***	2.185***
lognonlifden	2.679***	Δschet	0.262	-0.256	1.435***
dem	.	Δurbanp	0.642	1.885*	16.956***
autoc	.	Δdem	..	..	..
polity2	0.53	Δautoc	..	..	..
urbanp	3.32***	Δpolity2	..	..	..
		Δagva_2	0.213	12.993***	0.763***
		Δtel_2	0.301	36.249***	9.609***
		Δliql_2	0.209	9.719***	

"***”,"**"and "*" indicate significance at 1%, 5% and 10% respectively. The test is based on dataset1 (balanced) of 54 countries over the period 1992-2005, except variables that end with (_2) which are based on the dataset2 of 99 countries over the period 1987-2009. For institutional indicators the test does not provide results.

H_0: No Cross Sectional Dependence

Table 2- 4: Results of M-W-PP Test for Dataset 2 of 99 Countries over the Period 1987-2009

Series:	Agva	Autoc	Dem	Urbanp	Lognonlifpen	Liql	Lognonlifden	Tel	Loggdppc	Sches	Schet
With Individual effects											
Number of observations:	2148	724	1045	2156	1525	1898	1535	2171	2091	1677	1416
Cross-sections included:	99	35	49	98	88	92	89	99	99	99	98
Statistics	678.436	432.163	809.852	1498.24	186.056	147.251	183.707	204.797	163.325	183.618	85.1634
Probability	0	0	0	0	0.2872	0.9786	0.369	0.3553	0.9658	0.7603	1
with Individual effects, and individual linear trends											
Number of observations:	2148	768	1062	2134	1519	1898	1529	2171	2091	1674	1410
Cross-sections included:	99	37	50	97	86	92	87	99	99	98	96
Statistics	642.416	442.07	717.715	1747.69	158.062	137.218	182.592	59.4603	182.24	148.685	117.792
Probability	0	0	0	0	0.7693	0.9959	0.3125	1	0.7824	0.9951	1

Table 2- 4: *(continued)*

Series:	Δagva	Δautoc	Δdem	Δliql	Δloggdppc	Δlognonlifden	Δlognonlifpen	ΔSches	ΔSchet	Δtel	ΔUrbanp
with Individual effects											
Number of observations:	2049	686	967	1893	1992	1431	1419	1495	1210	2071	2037
Cross-sections included:	99	35	48	98	99	87	86	98	91	99	97
Statistic	2132.73	440.735	596.377	1405.59	614.494	816.558	840.306	764.723	539.524	424.144	**370.777**
Probability	0	0	0	0	0	0	0	0	0	0	0
with Individual effects, and individual linear trends											
Number of observations:	2049	704	967	1893	1992	1419	1410	1495	1210	2071	2037
Cross-sections included:	99	35	48	98	99	83	83	98	91	99	97
Statistic	2320.69	425.118	532.279	1314.12	481.698	713.23	785.807	680.555	490.272	560.623	219.862
Probability	0	0	0	0	0	0	0	0	0	0	0.0981

Null Hypothesis: Unit Root (individual unit root process); M-W-PP =Maddala-WU-Phillips-Perron Fisher Type; Newey-West automatic bandwidth selection and Bartlett kernel. For ΔUrbanp with trend the test Newey-West automatic bandwidth selection and Parzen kernel.

Table 2- 5: Summary of CIPS Test Results for Dataset 2 of 99 Countries over 1987-2009											
Series:	agva	autoc	dem	liql	loggdppc	lognonlifden	lognonlifpen	Sches	Schet	tel	Urbanp
With only a constant											
Number of observations:	1950	899	1024	1893	1912	1475	1493	1368	1093	2071	1980
countries included:	99	46	52	98	90	90	90	84	77	99	99
Z[t-bar] Statistic	-3.547	5.871	-0.242	0.480	-0.842	3.379	2.208	-0.390	7.648	1.516	2.559
P-value	0.000	1.000	0.404	0.684	0.200	1.000	0.986	0.348	1.000	0.935	0.995
With a Constant and trend											
Number of observations:	1950	899	1024	1893	1822	1475	1493	1368	1093	2071	1980
Countries included:	99	46	52	98	90	89	90	84		99	99
Z[t-bar] Statistic	4.248	5.476	0.855	2.237	3.798	4.296	5.028	4.170	7.978	2.886	2.057
P-value	1.000	1.000	0.804	0.987	1.000	1.000	1.000	1.000	1.000	0.998	0.980

Table 2- 5: *(continued)*											
Series:	Δagva	Δautoc	Δdem	Δliql	Δloggdppc	Δlognonlifden	Δlognonlifpen	ΔSches	ΔSchet	Δtel	ΔUrbanp
With only a constant											
Number of observations:	1851	899	965	1786	1732	1382	1397	1233	1093	1971	1881
countries included:	99	46	52	98	90	89	90	84	77	99	99
Z[t-bar] Statistic	-5.660	-9.498	-5.353	-10.859	-6.291	-3.827	-5.218	-6.189	-8.427	-6.547	-6.157
P-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Constant and trend											
Number of observations:	1851	899	965	1786	1732	1382	1397	1233	1093	1971	1881
countries included:	99	46	52	98	90	89	90	84	77	99	99
Z[t-bar] Statistic	-2.256	-7.581	-3.336	-6.386	-2.766	-1.844	-2.541	-2.352	-4.541	-3.223	-18.878
P-value	0.012	0.000	0.000	0.000	0.003	0.033	0.006	0.009	0.000	0.001	0.000

Δ denotes first difference

Table 2- 6: Summary of CIPS Test Results for 46 Countries over 1987-2009

Series:	agva	autoc	dem	liql	loggdppc	lognonlifden	lognonlifpen	Sches	logtel	Urbanp
With only a constant										
Number of observations:	865	284	385	897	947	835	842	801	961	966
Z[t-bar] Statistic	-0.314	0.212	0.608	1.510	1.479	1.736	0.933	0.868	1.946	2.638
P-value	0.377	0.584	0.728	0.935	0.930	0.959	0.824	0.807	0.974	0.996
With a Constant and trend										
Number of observations:	911	284	385	897	947	835	842	801	961	966
Z[t-bar] Statistic	0.292	0.153	1.137	3.603	2.088	0.862	2.491	2.543	1.059	3.937
P-value	0.615	0.561	0.872	1.000	0.982	0.806	0.994	0.995	0.855	1.000

Table 2- 6: (continued)

Series:	Δagva	Δautoc	Δdem	Δliql	Δloggdppc	Δlognonlifden	Δlognonlifpen	ΔSches	Δlogtel	ΔUrbanp
With only a constant										
Number of observations:	865	270		844	901	789	795	723	914	874
Z[t-bar] Statistic	-4.060	-7.036	NA	-6.067	-4.654	-4.095	-7.431	-10.278	-4.058	-2.675
P-value	0.000	0.000		0.000	0.000	0.000	0.000	0.000	0.000	0.004
With a Constant and trend										
Number of observations:	865	270		844	901	789	795	723	914	874
Z[t-bar] Statistic	-2.471	-6.293	NA	-2.698	-2.137	-6.424	-4.622	-8.120	-1.393	-9.860
P-value	0.007	0.000		0.003	0.016	0.000	0.000	0.000	0.082	0.000

Countries are Australia, Austria, Belgium, Bulgaria, China, Colombia Costa Rica, Denmark, Dominican Republic, Ecuador, Egypt, El Salvador, Finland, France, Greece, Guatemala, Hong Kong, China , Hungary ,Iceland , India, Kenya, Kuwait, Luxembourg, Mexico, New Zealand, Norway, Oman, Pakistan, Panama, Philippines, Russian Federation, Saudi Arabia, Singapore, Slovakia, Spain, Sri Lanka, Sweden, Switzerland, Turkey, Ukraine, United Arab Emirates, United Kingdom , United States, Uruguay, Venezuela, and Zimbabwe.

NA= No result available because of insufficient observation. Obs. =observations

Table 2- 7: summary of Cointegration Tests								
Cointegration test	Specification : LOGNONLIFDEN LOGGDPPC							
	Cross-sectionally de-meaned data				De-trended		De-trended and cross-sectionally de-meaned data	
	Without trend		With trend		Without trend			
Method	Statistic	Prob.	Statistic	Prob.	Statistic	Prob.	Statistic	Prob.
Kao - ADF	-4.322057	0.0000			-3.776926	0.0001	-3.776926	0.0001
$CADFC_P$ residual cointegration test results using original data and CCE approach								
	-14.80	0.000						
Cointegration test	Specification: LOGNONLIFPEN LOGGDPPC							
	Cross-sectionally de-meaned data				De-trended		De-trended and cross-sectionally de-meaned data	
	Without trend		With trend		Without trend			
Method	Statistic	Prob.	Statistic	Prob.	Statistic	Prob.	Statistic	Prob.
Kao - ADF	-3.350299	0.0004			-3.081252	0.0010		
$CADFC_P$ residual cointegration test results using original data and CCE approach								
$CADFC_P$	-13.67	0.000						
Cointegration test	Specification : LOGNONLIFDEN LOGGDPPC AGVA LIQL TEL URBANP SCHES DEM							
	De-meaned data				De-trended		De-trended and cross-sectionally de-meaned	
	Without trend		With trend		Without trend			
Method	Statistic	Prob.	Statistic	Prob.	Statistic	Prob.	Statistic	Prob.
Kao - ADF	-3.546555	0.0002			-3.272381	0.0005	-3.272381	0.0005
$CADFC_P$ residual Cointegration test results using original data and CCE approach								
$CADFC_P$	-17.94	0.000						
Cointegration test	Specification : LOGNONLIFPEN LOGGDPPC AGVA LIQL TEL URBANP SCHES DEM							
	Demeaned data				De-trended data		De-trended and cross-sectionally de-	
	Without trend		With trend		Without trend			
Method	Statistic	Prob.	Statistic	Prob.	Statistic	Prob.	Statistic	Prob.
Kao - ADF	-2.861729	0.0021			-2.192728	0.0142	-2.192727	0.0142
$CADFC_P$ Cointegration test results based on original data and CCE approach								
$CADFC_P$	-18.46	0.000						

Note for the Kao Test: Automatic lag length selection based on Schwarz Information Criteria (SIC); Newey-West automatic bandwidth selection and Bartlett kernel. H_0= no cointegration. The Kao test is conducted using EViews 7.1, which only allows for individual intercept. The test was conducted using the dataset of 46 countries over the period 1987-2009: The critical value at 5% for $CADFC_P$ is -2.28. It is from Banerjee and Carrion-i-Silvestre (2011, Table 3, p.29).

Table 2-8: Estimation Results of Error Correction Model Using CCEP

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Δlognonlifpen	Δlognonlifpen	Δlognonlifden	Δlognonlifden	Δlognonlifden	Δlognonlifpen
$ECT0_{t-1}$	-0.973***					
	(0.214)					
$ECT1_{t-1}$		-0.736***				
		(0.155)				
$ECT2_{t-1}$			-1.320***			
			(0.216)			
$ECT4_{t-1}$				-1.177***		
				(0.205)		
$\Delta loggdppc_{t-1}$	0.694***	0.499***				
	(0.251)	(0.181)				
$\Delta lognonlifpen_{t-1}$	0.319***	0.274***				
	(0.117)	(0.0928)				
$\Delta lognonlifden_{t-1}$			0.642***	0.600***	0.413**	
			(0.189)	(0.118)	(0.175)	
$ECT5_{t-1}$					-0.797***	
					(0.185)	
$\Delta lognonlifden_{t-2}$					0.248**	
					(0.116)	
$ECT6_{t-1}$						-0.310***
						(0.104)
Constant	-0.268***	-0.0214***	-0.374***	-0.505***	0.0364*	0.0463***
	(0.0457)	(0.00782)	(0.0693)	(0.0621)	(0.0182)	(0.00350)
Observations	597	653	596	596	726	757
R-squared	0.748	0.650	0.716	0.712	0.683	0.497
Number of countries	43	43	43	43	46	46
Adj. R-squared	0.487	0.423	0.424	0.416	0.352	0.0180

standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Δ denotes first difference; ECT0 and ECT2 (Error Correction Term) are residuals obtained using democracy indicators among other explanatory variables. By contrast ECT1 and ECT4 are residuals obtained using autocracy indicator among other explanatory variables. Similarly, ECT5 and ECT6 are obtained using only GDP per capita as an explanatory variable.

Table 2- 9: Panel Estimation Results of Dataset 2 of 99 Countries over the Period 1987-2009

	FE	FE	FE	FE	FE	FE	FE	FE	FE	FE	FE	FE	FE	FE
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Variables	lognonlifden	lognonlifden	lognonlifden	lognonlifden	lognonlifden	lognonlifden	lognonlifden	lognonlifpen	lognonlifpen	lognonlifpen	lognonlifpen	lognonlifpen	lognonlifpen	lognonlifpen
loggdppc	1.443***	1.055***	1.044***	1.064***	0.846***	0.842***	0.831***	0.443***	0.0550	0.0441	0.0636	-0.154*	-0.158**	-0.169**
	(0.0348)	(0.0651)	(0.0653)	(0.0649)	(0.0787)	(0.0792)	(0.0793)	(0.0348)	(0.0651)	(0.0653)	(0.0649)	(0.0787)	(0.0792)	(0.0793)
liql		0.00116*	0.00109*	0.00110*	0.00119*	0.00122*	0.00114*		0.00116*	0.00109*	0.00110*	0.00119*	0.00122*	0.00114*
		(0.000624)	(0.000623)	(0.000623)	(0.000663)	(0.000665)	(0.000665)		(0.000624)	(0.000623)	(0.000623)	(0.000663)	(0.000665)	(0.000665)
agva		-0.0117***	-0.0119***	-0.0107***	-0.0197***	-0.0203***	-0.0206***		-0.0117***	-0.0119***	-0.0107***	-0.0197***	-0.0203***	-0.0206***
		(0.00387)	(0.00386)	(0.00383)	(0.00460)	(0.00465)	(0.00463)		(0.00387)	(0.00386)	(0.00383)	(0.00460)	(0.00465)	(0.00463)
tel		0.00955***	0.00973***	0.00997***	0.00986***	0.00963***	0.00977***		0.00955***	0.00973***	0.00997***	0.00986***	0.00963***	0.00977***
		(0.00165)	(0.00164)	(0.00163)	(0.00172)	(0.00173)	(0.00172)		(0.00165)	(0.00164)	(0.00163)	(0.00172)	(0.00173)	(0.00172)
urbanp		-0.00290	-0.000389	-0.00178	0.000504	-0.000508	0.00168		-0.00290	-0.000389	-0.00178	0.000504	-0.000508	0.00168
		(0.00327)	(0.00343)	(0.00332)	(0.00339)	(0.00336)	(0.00350)		(0.00327)	(0.00343)	(0.00332)	(0.00339)	(0.00336)	(0.00350)
dem		0.00249				0.000113			0.00249				0.000113	
		(0.00494)				(0.00545)			(0.00494)				(0.00545)	
autoc			0.0135**				0.0146**			0.0135**				0.0146**
			(0.00671)				(0.00731)			(0.00671)				(0.00731)
polity2				-0.00153	-0.00275						-0.00153	-0.00275		
				(0.00295)	(0.00322)						(0.00295)	(0.00322)		
sches		0.00163**	0.00164**	0.00154**					0.00163**	0.00164**	0.00154**			
		(0.000733)	(0.000731)	(0.000727)					(0.000733)	(0.000731)	(0.000727)			
schet					0.00385***	0.00385***	0.00390***					0.00385***	0.00385***	0.00390***
					(0.000883)	(0.000888)	(0.000886)					(0.000883)	(0.000888)	(0.000886)
Constant	-7.912***	-4.757***	-4.829***	-4.887***	-3.110***	-3.016***	-3.076***	-7.912***	-4.757***	-4.829***	-4.887***	-3.110***	-3.016***	-3.076***
	(0.299)	(0.513)	(0.513)	(0.510)	(0.624)	(0.631)	(0.630)	(0.299)	(0.513)	(0.513)	(0.510)	(0.624)	(0.631)	(0.630)
Observations	1,709	1,366	1,366	1,375	1,234	1,227	1,227	1,709	1,366	1,366	1,375	1,234	1,227	1,227
R-squared	0.516	0.514	0.516	0.517	0.546	0.541	0.542	0.091	0.127	0.129	0.129	0.165	0.161	0.164
Number of id (countries)	97	90	90	90	91	91	91	97	90	90	90	91	91	91
Adj. R-squared	0.487	0.477	0.479	0.481	0.507	0.501	0.503	0.0367	0.0605	0.0634	0.0637	0.0941	0.0888	0.0921

Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Table 2- 9: (*continued*)

	CCEP	CCEP	CCEP	CCEP	CCEP	CCEP	CCEP	CCEP	CCEP	CCEP	CCEP	CCEP	CCEP	CCEP
	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)	(28)
Variables	lognonlifden	lognonlifden	lognonlifden	lognonlifden	lognonlifden	lognonlifden	lognonlifden	lognonlifpen	lognonlifpen	lognonlifpen	lognonlifpen	lognonlifpen	lognonlifpen	lognonlifpen
loggdppc	1.325***	0.952***	0.933***	0.965***	0.797***	0.791***	0.775***	0.323***	-0.0501	-0.0692	-0.0371	-0.203**	-0.208**	-0.225***
	(0.0592)	(0.0765)	(0.0770)	(0.0762)	(0.0849)	(0.0855)	(0.0857)	(0.0591)	(0.0766)	(0.0771)	(0.0762)	(0.0847)	(0.0853)	(0.0855)
liql		0.000991	0.000884	0.000941	0.00117*	0.00121*	0.00112*		0.000998	0.000897	0.000947	0.00114*	0.00118*	0.00109
		(0.000623)	(0.000623)	(0.000623)	(0.000665)	(0.000666)	(0.000666)		(0.000624)	(0.000623)	(0.000623)	(0.000663)	(0.000665)	(0.000664)
agva		-0.0112***	-0.0111***	-0.00997***	-0.0188***	-0.0193***	-0.0195***		-0.0112***	-0.0111***	-0.0100***	-0.0188***	-0.0194***	-0.0196***
		(0.00387)	(0.00386)	(0.00384)	(0.00462)	(0.00467)	(0.00465)		(0.00387)	(0.00387)	(0.00384)	(0.00461)	(0.00466)	(0.00464)
tel		0.0101***	0.00990***	0.0103***	0.0113***	0.0111***	0.0111***		0.0101***	0.00988***	0.0103***	0.0112***	0.0110***	0.0109***
		(0.00184)	(0.00184)	(0.00183)	(0.00197)	(0.00199)	(0.00199)		(0.00184)	(0.00184)	(0.00183)	(0.00197)	(0.00199)	(0.00198)
urbanp		-0.00509	-0.00317	-0.00404	-0.000307	-0.00116	0.000276		-0.00519	-0.00334	-0.00421	-0.000298	-0.00111	0.000303
		(0.00361)	(0.00371)	(0.00363)	(0.00399)	(0.00399)	(0.00406)		(0.00362)	(0.00371)	(0.00364)	(0.00398)	(0.00398)	(0.00405)
dem		0.00192				5.29e-05			0.00222				-2.43e-05	
		(0.00497)				(0.00556)			(0.00498)				(0.00555)	
autoc			0.0156**				0.0154**			0.0155**				0.0158**
			(0.00683)				(0.00747)			(0.00684)				(0.00746)
polity2				-0.00206	-0.00275						-0.00193	-0.00283		
				(0.00298)	(0.00329)						(0.00299)	(0.00328)		
sches		0.00121	0.00117	0.00116					0.00118	0.00115	0.00113			
		(0.000753)	(0.000752)	(0.000748)					(0.000754)	(0.000753)	(0.000748)			
schet					0.00319***	0.00313***	0.00305***					0.00316***	0.00308***	0.00301***
					(0.00107)	(0.00108)	(0.00108)					(0.00107)	(0.00108)	(0.00108)
								(2.568)	(2.902)	(2.944)	(2.949)	(3.276)	(3.263)	(3.283)
Constant	-7.095***	-7.897***	-7.588**	-7.826***	-4.254	-5.545	-4.354	-7.058***	-6.929***	-5.913*	-6.469**	-4.388	-6.057*	-4.323
	(0.447)	(2.561)	(2.970)	(2.660)	(3.645)	(3.458)	(3.931)	(0.447)	(2.581)	(3.018)	(2.698)	(3.638)	(3.458)	(3.922)
Observations	1,709	1,366	1,366	1,375	1,234	1,227	1,227	1,709	1,366	1,366	1,375	1,234	1,227	1,227
R-squared	0.518	0.522	0.524	0.525	0.548	0.544	0.545	0.096	0.139	0.142	0.141	0.174	0.170	0.173
Number of id (countries)	97	90	90	90	91	91	91	97	90	90	90	91	91	91
Adj. R-squared	0.488	0.483	0.484	0.486	0.506	0.501	0.503	0.0402	0.0683	0.0712	0.0704	0.0970	0.0920	0.0956

Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Chapter 3:

The Demand for Life Insurance across Countries: Do Bequest Motives Matter?

3.1. Introduction

A primary reason for purchasing life insurance coverage is the bequest motive, i.e., to provide for one's dependents in case of premature death of the wage earner. Nevertheless, countries are diverse in terms of their life insurance per capita consumption. According to Swiss Re (2009, p.17) in 2008, on a per capita basis, an average of USD 2175 was spent on life insurance in industrialized countries. By contrast, on average, USD 47 per capita was spent on life insurance in emerging economies, Swiss Re (2009, p.23). By the same token, three regions of the world accounted for more than 80 percent of world-wide life insurance market indicating regional an uneven distribution. According to Swiss Re (2009), in 2008, Western Europe accounted for about 41 percent, and North America for some 25 percent followed by Japan and newly industrialized Asian economies that accounted for about 21 percent of the market.[60]

Such consumption variations may raise questions about whether individuals'/ households' type of bequest motive may have implications for the demand for life insurance.[61] The theory of the demand for life insurance predicts that an expected

[60] The share of Africa's market was about 1.5 percent, central and Eastern Europe's market was about one percent, Middle East and Central Asia's market was 0.31 percent, Latin America and Caribbean's market was 1.64 percent, South and East Asia market was 6.6 percent and that of Oceania's market about 1.78 percent, Swiss Re (2009).

[61] For a review see ch.1 section 1.7.1. Existing international studies focus on general factors that may affect life insurance consumption. More specifically Wasow (1986) focuses on the impacts of public policies on the volume of insurance premiums, and Ward and Zurbruegg (2002) on the effects of law and politics on life insurance consumption. By contrast, Outreville (1996) sheds light on the role of financial development and market structure for life insurance markets. Enz (2000) investigates the

utility maximizing household with uncertain life time of the wage earner will choose optimal life time consumption and bequests (life insurance coverage).[62] Dependents will receive the face value of life insurance policy in case of premature death of the wage earner. In this framework the demand for mortality coverage is derived solely from the bequest function, Chang (2004, p.56). This has led some writers to suggest that *"(s)ince the bequest function is independent of the number or circumstances of recipients, the utility associated with a transfer arises purely from the act of donation."*, Shorrocks, (1979, p.415). In order to mitigate these shortcomings, Lewis (1989) analysed how the bequest motive should be formed to accommodate the demand for life insurance coverage, (Villeneuve, 2000, p.910; and see also Chang, 2004, p.56). Lewis (1989) suggested, a model in which, parents act (purchase life insurance coverage) to maximize the utility of their offspring (beneficiaries). According to Lewis the wage earner's demand for life insurance depends on the number of dependents and demographic structure of the household. He tested the model using US households' data and found evidence supporting the model. He indicated that the model depicts actual household life insurance purchase.

Lewis's framework has been applied by Browne and Kim (1993), and Beck and Webb (2003) using international data sets that include both developing and developed countries. While the former study reports that young dependency ratio is positively related to life insurance, the latter study reports that there is no robust

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impacts of economic development, as measured by GDP per capita, on insurance development. Park, Borde and Choi (2002), and Chui, and Kwok (2009) and Park, and Lemaire (2011) focus on possible influence of national cultures on insurance consumption. Beenstock, Dickinson and Khajuria (1986), and Browne and Kim (1993), Beck and Webb (2003), and Li et al (2007) focus on general determinants of the demand for life insurance consumption.

[62]Yaari (1965) using a continuous time model showed that it is beneficial for an expected utility maximising risk averse consumer under uncertain life time, with bequest motives, to purchase life insurance protection. Similar to Yaari, Håkansson (1969) analysed the problem of an expected utility maximising risk averse consumer with bequest motive using a discrete-time model. Campbell (1980) using a one period model suggests that the demand for life insurance depends on income losses, household's risk aversion, the loading and household's intensity for bequest.

relationship between young dependency ratio and life insurance consumption. On the one hand, the results of Browne and Kim (1993) cross section study may be weak as it may be subjected to selection year biased, as noted by Chui and Kwok (2009, p.274), and the sample of 45 countries used is relatively small. On the other, Beck and Webb's study may not provide conclusive evidence against Lewis's model. The two studies do not investigate what parents derive to purchase life coverage or the impact of types of bequest motives, which may vary across countries (societies) at different stages of development and is likely to have implications for the demand for life insurance.

Lewis's framework seems to suggest that altruism motivates bequest (life insurance coverage). However, parents may have a different bequest motive say bequest-as-exchange motive. In the latter children may be used as a form of insurance. It is widely documented practice in developing countries that parents take care of their children until they reach adulthood, in exchange for short term benefits from children (e.g., casual work during childhood), and long term benefits from children (e.g., support parents in old age, when children are grown).

Nugent (1985) summarizes the conditions under which one would expect the old-age security motive for fertility is likely to prevail in rural areas of developing countries and especially among women. Among these conditions ": (1) underdeveloped capital markets; (2) uncertainty about the accumulation of assets necessary for old age and disability; (3) the absence or inefficiency of private or public old-age and disability insurance programs", Nugent (1985,p76).[63]

[63] Other conditions are:

"*(4) confidence in the loyalty of children to their parents; (5) the absence of well-developed labour markets for women and children (nonstandard labour); (6) underdeveloped markets for the goods and ser- vices that elderly people consume; (7) the absence of a spouse who is of considerably younger age; and (8) the perception of old age as an appreciable portion of the life cycle*.", Nugent (1985, p76).

Moreover, Cain (1981, 1982, and 1983) argues that children in developing countries are used as insurance to mitigate risks. Jakoby and Skoufias (1997) using rural Indian data set found evidence that household use child labour as a form of self insurance. Similarly Pörtner (2001) analysed the link between a household's decision on the number of children, and future income risk in the presence of imperfect insurance and credit markets, as the case in less developed countries. His analysis suggests that for a risk averse household children are substitute for insurance.

Having this background this chapter sheds light on whether types of bequest motives may have implications for life insurance consumption variations across countries. It also incorporates the extended family institution as a possible determinant of life insurance consumption. The chapter also investigates the long run economic relationship between the demand for life insurance and its determinants as opposed to the general insurance case examined in chapter two. Existing international empirical work has paid little attention to the long run relationship between life insurance consumption- driven by the bequest motive- and its possible determinants.

The rest of the chapter is structured as follows: Section 3.2 highlights life insurance activities. Section 3.3 provides an overview of the determinants of the demand for life insurance coverage. Section 3.4 presents hypotheses and model specification. Section 3.5 describes data measures, sources, summary statistics, and correlations. Section 3.6 presents diagnostic test and estimation results. Conclusions are in Section 3.7.

3.2. Life Insurance Activities

Life insurance activities are traditionally meant to provide pure insurance coverage against the risk of premature death. A risk averse individual (breadwinner) with bequest motive will be willing to pay insurance premiums in return for coverage to be paid to the beneficiaries (dependents) in the event of the breadwinner's premature death. Such an insurance contract is called term insurance. The contract may be simply for a period of ten years to be renewed for another period, or for a shorter/longer period, renewable annually.[64] Dependents receive payment from the insurer if the death of the breadwinner occurs during or before the end of the specified period. However, if the breadwinner (insured) survives to the end of the specified period, he/she does not receive any payment.

In addition to the pure insurance coverage, the policy may include a voluntary saving element for investment.[65] The policy holder can choose either to have a share in the insurance company's profits and dividends (returns), which will depend on investment performance, or to get a fixed benefit during the contract, e.g. a minimum guaranteed interest rate, Swiss Re (2003, p.4).

Life insurance services also offer annuities which provide coverage for the policyholder against longevity risk. The insured pays premiums to the insurer in exchange for coverage, which is payable during a fixed period of time or the entire period of the insured's lifetime.[66]

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[64] See Skipper and Kwon (2007, p.531)
[65] Such policies include whole life insurance, universal life insurance and endowment insurance .Whole life insurance provides insurance coverage over the insured's death regardless when it does happen; under endowment contract insurance coverage is payable either on the date of insured's death or on the maturity of the policy; universal life policies provides insurance coverage over the insured's death regardless when it does happen and that the policy holder can choose/amend the amount of premiums payment and the level of coverage, Skipper and Kwon (2007, pp.533-536) .
[66] Skipper and Kwon (2007, p.536.).

Although the focus of the chapter is on the relationship between pure life insurance coverage and its determinants, the empirical part utilises aggregate life insurance premiums data. Life insurance premiums data across countries is only available in aggregate form that includes different types of life insurance policies and annuities. As noted by Browne and Kim (1993) and Beck and Web (2003) although such aggregation reduces the likelihood of establishing significant relationship between life insurance consumption and hypothesized determinants, it indicates robustness of any significant relationship.

3.3. Determinants of the Demand for Life Insurance

This section briefly describes the determinants of life insurance consumption in the context of a Marshallian model to preserve Yaari's (1965) terminology. The basic determinant is the bequest motive. Other determinants include income, the price of life insurance services, and availability of alternative institutions.

3.3.1. Income and Risk Aversion

Income is likely to have positive impact on the demand for life insurance. High levels of income/wealth allow people to pay for life insurance coverage to mitigate income losses due to premature death of the wage earner. Theoretical works (Fortune, 1973; Campbell, 1980; and Lewis, 1989) have shown that the demand for life insurance depends, among other things, on individual's risk aversion, income (wages and salaries) and the initial amount of nonhuman wealth.[67]

In line with the theoretical prediction, empirical studies of Wasow (1986), Beenstock, Dickinson and Khajuria (1986), Browne and Kim (1993), Outreville

[67] Note that nonhuman wealth variable is omitted in international empirical work on life insurance due to lack of data.

(1996), Ward and Zurbruegg (2002), Beck and Webb (2003), and Li et al (2007), report positive and significant impact of income on life insurance consumption.

Similarly, Ward and Zurbruegg (2002), and Li et al (2007) report positive and significant relationship between risk aversion and life insurance consumption.

3.3.2. Bequest Motives

The theory of the demand for life insurance predicts a positive relationship between life insurance consumption and bequest (Yaari, 1965; Håkansson, 1969; and Campbell, 1980). In this context, Lewis (1989) suggests that offspring demand life insurance to mitigate income losses due to premature death of parents. In Lewis's model parents pay insurance premiums expenditures to obtain life insurance coverage for offspring. Lewis's framework seems to suggest that altruism motivates bequest (purchase of life insurance coverage). However, parents may have a different type of bequest motive. To understand the impact of bequest types on life insurance consumption we consider, for simplicity, two fertility and bequest motives, namely pure altruistic motive and pure exchange motive. The two cases, namely pure altruism and pure old age exchange motives are the extreme poles. In the real world, parents may be partly motivated by altruism, and partly may expect old age support from their children. According to Becker's (1981, p.173) analysis the utility function for altruistic parents depends on the well-being of their children, i.e., parents spend their income not only on consumer goods and services but also on improving the quality of their children. In Becker's framework (1981, p.95) parents' utility function may be expressed as follows: $U = u(c, q, n)$ where c is consumption good, q is the quality of children, and n is the number of children. Becker and Lewis (1973, 1988) suggest that, altruistic parents, according to their budget restriction, choose the optimal combination between the quantity and quality of children. De Tray (1973) postulates that quality and quantity are substitute in the household's production function for child services.[68]

By contrast, in the pure old age security motive for fertility, parents view children as a capital good intended to provide for old age consumption, when parents can no longer work, i.e., children are means of transferring present consumption/income (from parents' productive years) to future one (parents' unproductive years/old age); and that having more children at an early stage of parents' life increases their consumption at old age, Razin and Sadka (1995, pp.23-26). Consequently, Razin and Sadka (1995, p.24) suggest that parents are assumed to derive utility only from current and future consumption and not from the number or quality of their children, i.e., $U = u(c_1, c_2)$ where c_1 is consumption in period one (productive years) and c_2 is consumption in period two (unproductive years/old age).[69]

The implications of the two bequest motives for fertility are that while altruistic parents are likely to have relatively few children, parents with pure bequest-as-exchange motive is likely to have relatively more children. While mortality coverage is likely to be positively related to the number of dependents in the altruistic motive, it is likely to be negatively related to the number of dependents in the bequest as exchange old age security motive. Therefore, the total effect of the number of offspring on life insurance consumption when using aggregate data that contains societies/countries with different types of bequest motives is likely to be ambiguous. While longevity coverage is likely to be positively related to the number of old dependents in the altruistic motive, it is likely to be negatively related to the number of old dependents in the bequest as exchange old security motive; and the total effect

[68] Becker (1981, p.197) suggests that altruistic parents invest more than selfish parents on the quality of children. Examples of investments are education, and life insurance purchase.
[69] Cremer and Pestieau (1991) showed that the strategic exchange bequest motive induces parents to have large number of children to obtain a greater amount of old-age assistance.

on the demand for longevity coverage using data that contains societies/countries with different bequest types is ambiguous.

Existing international empirical studies seem to assume that the number of dependents would be reflected positively in the demand for mortality coverage. In other words the number of dependents reflects the bequest intensity. This may be true when the motive for fertility/bequest is pure altruism, but not necessarily if the type of fertility/bequest motive is old age security/bequest-as-exchange.[70]

3.3.3. Price of Life Insurance Coverage

The price of life insurance coverage consists of the expected loss (actuarially fair price) and loading expenses. Campbell (1980) has shown that for a risk averse household, the optimal life insurance coverage is a decreasing function of insurance loading. Browne and Kim (1993) report negative and significant relationship between the demand for life insurance and its price.

Unfortunately, data on the commercial price of insurance is not available to us. Available data, i.e., premiums, is a combination of coverage purchased and price. Outreville (1996) suggested that life expectancy at birth reflects the actuarially fair price of life insurance in a country and hypothesized a positive relationship between life expectancy and life insurance consumption. It is likely that the actuarial price of life insurance decreases with increase in life expectancy as noted by Beenstock, Dickinson, and Khajuria (1986), and Outreville (1996). Ward and Zurbruegg (2002) also hypothesized a positive relationship between life insurance consumption and life

[70] Notably, even for altruistic parents, for a given household income and budget constraint, an increase in fertility leads to a reduction in future consumption relative to current consumption.

expectancy.[71] Following these authors, we also hypothesize a positive relationship between life expectancy in a country and life insurance consumption.

As the cost of insurance most likely includes insurance loading a possibility is the use of factors that may affect the cost/price of insurance. Beck and Webb (2003, p.58) suggest that insurer's ability to provide cost effective insurance services is a function of varying levels of, among other things, institutional development, political stability, and banking sector development. In this chapter we use the level of financial development, institutional quality, and physical infrastructural development to proxy factors that affect insurance loading, i.e., insurer's ability to provide cost effective insurance services and hence, the demand for life insurance.

3.3.3.1. Financial Development/Returns on Investment

Financial development in a country is likely to have a positive impact on life insurance consumption. On the one hand, the size of the financial system is likely to affect information availability, sources of funds for investments and associated costs, (see Barth and Brumbaugh 1997, pp.7-8). A small financial system with limited financial actors is likely to be less efficient than a large financial system with large actors of firms and capital markets. Large financial actors are likely to benefit from large scale operations and hence achieve economies of scale, which leads to low transaction costs. This may explain current trend in providing life insurance and bank activities by one institution such as Bancassurance. Indeed, in many western European countries life insurance products are mainly sold to consumers by

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[71] Nevertheless, Ward and Zurbruegg (2002) point out a number of problems of life expectancy as an indicator of the fair price of insurance. According to the authors, these problems are:

> "*First, it (life expectancy) refers to the general population, not the pool of risks insured by the average life insurance company. Second, life expectancy is notoriously inaccurate…, with a need to price into life insurance the additional risk of life expectancy error. Third, long-running insurance will have been underwritten and priced with very different assumptions of mortality risk from those currently used. Fourth, life expectancy does not account for the ability to discount life insurance liabilities by investment returns*." p.400.

Bancassurance and a similar pattern of development is growing in other countries, CEA (2010).

On the other, the level of capital market development is likely to affect profitability and development of insurance market in a country. Since capital markets are to facilitate the flow of long-term capital from lenders to investors, Barth and Brumbaugh (1997, p.3), its size and depth is likely to affect both savings and investment opportunities, and hence gained returns. Higher returns and higher interest rates will allow insurers to offer higher profits and low cost coverage to policy holders.[72] Li et al (2007) note that high interest rates are likely to decrease the cost of insurance. Hence, the more developed a financial system is, the more likely is to provide life insurance services at a lower costs.

Notably, the anticipation of higher returns may make policy holders reduce their saving through life insurance. Therefore, the impact of interest rates *per se* on the demand for life insurance is likely to be ambiguous.

Outreville (1996), Ward and Zurbruegg (2002), and Li et al (2007) reported a positive and significant impact of financial development on life insurance consumption.

In contrast, empirical results on the impact of interest rates are mixed. While Beck and Webb (2003) reported positive and significant relationship between real interest rates and life insurance consumption, Li et al (2007) reported a negative and significant relationship.

[72] Life insurers offer varieties of insurance products that contain voluntary saving for investment in return of returns (see Swiss Re 2003). Policy holders cannot withdraw their premiums and savings suddenly and in a large scale, which allows life insurers to earn high returns as they engage in long-term investments in the financial market such as long-term bonds and equities in greater volume and incur lower transactions costs than each individual policy holder would have done, (see Swiss Re 2003; and James and Vittas, 2000).

3.3.3.2. Institutional Quality

Institutional quality affects the level of transaction costs. North (1997) pointed out that political and economic institutions affect transactions costs and facilitate contracts and efficient markets. According to North (1997) the institutions include (1) a well defined and complete specified property rights that allow measuring contract performance and constrain opportunistic behaviour in impersonal markets; and (2) effective judicial, legal, and impartial enforcement system.

Although countries have laws and judicial systems, the degree to which public laws and regulations are put into practice vary across countries. That is, how the set of public laws and regulation, under which economic agents operate and interact, is applied in practice affects the level of transaction costs. High institutional quality is likely to be associated with lower transaction costs than low institutional quality.

Ward and Zurbruegg (2002), Beck and Webb (2003), Chui, and Kwok (2008, 2009), and Park and Lemaire (2011) reported positive and significant relationship between life insurance consumption and indicators of institutional development.

3.3.3.3. Physical Infrastructural Development

The level of infrastructural development in a country is likely to affect the costs incurred by an insurance carrier. Poor physical infrastructures will likely to be associated with high transaction costs. For a formal financial institution to operate in a remote rural area in a developing country, for instance, both fixed and operation costs may be high compared to potential transactions, which are in many cases of small scale type ones (World Bank, 1989, p.112). These elements may limit/facilitate the use and development of insurance services. The implication is that the more developed a country's physical infrastructure (e.g., paved roads and bridges, electricity, and telecommunications) the less costs (e.g., business start up, and transaction costs) incurred by formal insurance services. Level of infrastructural development is important for choosing firm geographical location both in a country and among countries.

3.3.4. Anticipated Inflation

A life insurance contract is a promise by the insurer to pay insurance coverage to the beneficiaries in the event of breadwinner's death sometime in the future. As noted by Babbel (1979), main features of life insurance policies are that these contracts are often long term ones and specified in fixed, nominal currency units without the adjustment to compensate for possible value erosion caused by inflation. Therefore, the anticipation of inflation may have negative impact on the demand for life insurance. Individuals will take into account not only mortality risk but also purchasing power risk when deciding on the purchase of insurance.

Beenstock, Dickinson, and Khajuria (1986), Wasow (1986), Browne and Kim (1993), Outreville (1996), Ward and Zurbruegg (2002), Beck and Webb (2003), Li et al (2007) and Park and Lemaire (2011), report negative and significant impact of inflation/anticipated inflation on life insurance consumption.

3.3.5. Alternative Institutions

Life insurance is a market institution to mitigate future consumption risk. Therefore, other related institutions either market, nonmarket institutions or public schemes need to be taken into account when studying the determinants of the demand for life insurance. These alternative institutions include savings, social welfare and the institution of the extended family and are highlighted below.

3.3.5.1. Savings

Savings can take several forms. One form is life insurance. Borch (1980, p.103) noted that life insurance is a form of saving (future consumption) for the rainy day. Different types of life policies aim at providing income for beneficiaries in case of premature death of the breadwinner. Besides, annuities aim at providing income for the annuitant during retirement period. Other forms of savings include deposits and bonds.[73]

Savings is likely to have negative impact on life insurance. As life policies often contain elements of voluntary savings for investments, Fortune (1973, p.595) argues that life policies are substitutes for other forms of savings and financial assets, e.g., bonds. Headen and Lee (1974, p. 687) also argue that "*life insurance demand may be determined, at least partially, by household financial asset portfolio decisions*." They suggest that factors that affect the allocation of household's wealth into alternative assets in the short run include, among other things, future prices, income, rates of returns, and level of wealth.

Empirical findings are mixed. Beck and Webb (2003) found a positive relationship between life insurance penetration and private saving. In contrast, Wasow (1986) report negative and significant impact of gross domestic saving on life insurance premiums.

[73]As the essence of life policies is risk sharing, its advantages over other forms of savings have discussed in the literature. Annuities may be distinguished from other traditional forms of saving in that there will be no money wasted that the annuitant want to consume, Borch (1980, p.103).

3.3.5.2. Social Security and Welfare

The link between social security and life insurance arises because a household may make its insurance decision taking into account social security's welfare and benefits.[74] Social security and welfare programs that increase/provide income while the breadwinner is alive are expected to promote life insurance consumption, Fitzgerald (1987, p.87). However, survivor benefits programs represent a substitute for life insurance coverage, hence decreases the demand for life insurance, Fitzgerald (1987, p.87).

Due to limited availability of disaggregated data across countries, existing empirical studies often use aggregate data on national social security expenditures. Therefore, as noted by Browne and Kim (1993), it is difficult to make assumption about the relationship between social security and life insurance consumption a priori.

Empirical studies reported mixed results about the relationship between social security and life insurance consumption. While Browne and Kim (1993) reported significant and positive relationship between life insurance consumption and social security, Beenstock, Dickinson, and Khajuria (1986), Ward and Zurbruegg (2002), and Li et al (2007) reported negative and significant impact of social security on life insurance consumption.

3.3.5.3. The Extended Family

It is widely recognised that in developing societies the extended family takes care of dependents in case of premature death of the bread winner, i.e. loss of parent(s),

[74] Social security programs are public schemes that include social insurance programs and welfare benefits. Social insurance programs include, among other things, pensions, disability insurance, unemployment insurance, survivor benefits, Skipper and Kwon (2007, p.199).

(see Fafchamps, 1992). Although whether such an informal risk sharing mechanism/ institution is a substitute or complement to life insurance is an empirical matter, we tend to suggest that the extended family institution is a substitute for life insurance. Theoretical models suggest that informal risk sharing institutions/ contracts are not first best solution. Kimball (1988) using a repeated game model has shown that self-enforcing mutual assistance and informal risk sharing modes can exist and that income risk sharing at any date will depend on incomes realized at that date. Coate and Ravallion (1993) extend Kimball's work, and characterize the best informal contract that can be sustained as a non-cooperative equilibrium and point out that this optimal informal arrangement diverges from first best-risk sharing which maximize expected utility that can be achieved with explicit binding commitments.

Nevertheless, Cox and Jimenez (1990) note that private inter-household transfer that takes place in many developing countries constitute not only an important source of income but also plays an important role in ameliorating/ mitigating risks. Cox and Fafchamps (2008, pp. 3733-3734) suggest that about 40 percent of households in the developing world are involved in private transfers in a given year (either as recipients, donors, or both). Cox and Jimenez (1990) suggest that the relationship between the probability of receiving transfer and individual' age has a U-shape. Private transfer is high at early and late ages, i.e., during young and old ages. For instance, a family who loses its breadwinner can expect to get transfer from relatives, and friends. Other occasions on which to receive transfer or exchange cited by Cox and Jimenez include illness, disability, unemployment and female headed households.

Cox and Jimenez (1990) argue that people make private transfer motivated by altruism and /or self interest exchange. In the latter case transfer may be given today in cash or in kind to be repaid sometime in the future. They indicate that empirical evidence on the motive for private transfer is mixed. For instance, Cox, Eser and Jimenez (1998) using household survey data for Peru found some evidence for the exchange motive. The data also conveys that most of the transfer occurs between parents, children, and other relatives.

Kotlikoff and Spivak (1981) also suggest that interfamily transfer can provide informal insurance against longevity risk. They indicate that such transfer does not need to be motivated by altruism; but it may be simply reflect self interest exchange behaviour between selfish family members, and can substitute for the purchase of annuities.

3.4. Hypotheses and Model Specification

3.4.1. The Model

Consider a household with a single breadwinner and with bequest motives. The household may be subjected to income loss due to the risk of premature death of the breadwinner. Suppose that the breadwinner's current age is t, and his/her work life expectancy (i.e., the years the agent is expected to work between his current age and the end of his life expectancy) ends at age T, where $t < T$. Following Campbell (1989) suppose that the household is considering a one period planning horizon of Δt_0 at current time t_0, $(t_0, t_0 + \Delta t_0)$, i.e., from time t_0 to time $t_0+\Delta t_0$, where Δt_0 is the planning period (which can be defined in units of a year), with $\Delta t_0>0$. The breadwinner earns income each period he/she survives, but if she/he dies there are no further earnings. Then at time t_0 one will be able to estimate the present value of future income inflow during agent's work life expectancy. Let y denote the present value of breadwinner's future labour income between the age t and T, conditional on the breadwinner's survival until the age T.

Breadwinner's probability of death is assumed to follow a Poisson process and is {probability of death arrival in $(t_0, t_0 + \Delta t_0)$ }= $\pi(t_0)dt$, and the probability of survival is given by $1-\pi(t_0)dt$. The probability of death in the interval $(t_0, t_0 + \Delta t_0)$ is independent of death arrival outside the interval.

Since inflation in a modern economy is inevitable, the model needs to include such a risk. Inflation risk is incorporated into the model as a multiplicative risk that affects consumer nominal income in cases of death or survival, say via a random purchasing power index $\tilde{x}$. That is, the representative individual is assumed to assess inflation rates as a random variable. For simplicity inflation risk is assumed to be uninsurable.

Assume that the agent has a Von Neumann-Morgenstern (VNM) utility function U with at least a third derivative with $U'>0$ and $U''<0$ and the bequest utility function V with $V'>0$ and $V''<0$. Assume also V is a linear transformation of U. That is, $V=\lambda U$, where λ is the intensity for bequest and measures the degree of agent's altruism towards his/her dependents. The greater the value of λ is, the more the agent care about her dependents' welfare (e.g., the more he/she will be willing to purchase life insurance, ceteris paribus). Agents/individuals with no utility of bequest will have $\lambda=0$.

The insurance decision is made at time t_0. At time t_0 the agent maximizes the expected utility of her real wealth[75] with respect to life insurance coverage or face

[75] The approach of utility over real wealth was applied by Biger and Kahane (1976) on the performance of non-life insurance companies, and in other areas, see for example Biger (1975) for portfolio selection and Adam-Müller (2000) for optimal hedging in the presence of inflation risk. The incorporation of inflation risk in the model is important in light of the fact that real insurance policies are often unavailable; see for example James and Vittas (2000). Some countries do offer inflation

value B. We assume that the face value is paid at the end of the year (period) and it is adjusted for actual investment return in the year.

Assume also there is an insurance market under perfect information with no asymmetrical information and transaction costs. Let W_0 denote agent's initial wealth (assets); and p the rate of insurance premium, where p is between zero and one, and P the insurance premiums is P=pB. The agent will obtain the desired coverage at a fair premium. That is, $p=\pi(t_0)dt$.

Then, we can write agent's insurance decision as maximizing the expected utility of her income as follows:

$$\underset{B}{Max}\, E(U)=\{\pi(t_0)dt\lambda V(\tilde{x}W_l)+(1-\pi(t_0)dt)U(\tilde{x}W_n)\} \tag{3.1}$$

where $W_l=(W_0-C-pB)(1+r)+B+s$ and $W_n=(W_0-C-pB)(1+r)+y+s$, W_l and W_n are wealth levels, and subscripts *l* and n denote loss and none loss states, respectively. W_l-s is the total bequest in the event of death of the breadwinner or "contingent bequest" as Kotlikoff (1989, p.406) suggests, (see also Chang, 2004). It is composed of savings (W_0-C-pB)(1+r) and life insurance coverage B. C and s denote consumption, and social security and welfare, respectively. Differentiating equation (3.1) with respect to B and rearranging gives the first order optimality condition:

$$(1-p)\pi(t_0)dt\lambda V'(\tilde{x}W_l)=p(1-\pi(t_0)dt)U'(\tilde{x}W_n), or\ \frac{p(1-\pi(t_0)dt)}{(1-p)\pi(t_0)dt}=\frac{\lambda V'(\tilde{x}W_l)}{U'(\tilde{x}W_n)} \tag{3.2}$$

As the second order condition is negative, and with actuarial insurance premiums the agent will choose full insurance coverage, if and only if the intensity for bequest, λ, is equal to unity. That is,

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indexed policies while not in others. It is also important because of the aggregate data used in this chapter which includes both life insurance and life annuities.

$$B = y \tag{3.3}$$

This is the case of an individual with extreme altruism towards his/her dependents, where V=U, and equate wealth at the two states, namely $W_l = W_n$. Under the assumptions of perfect information and no transaction costs, agents will trade risk directly without intermediaries. However, in a complex environment agents may not be able to trade risk directly. Therefore, we will assume, instead, the presence of imperfect information and transaction costs. That is, $p > \pi(t_0)dt$. In such a case define the insurance premium that the agent must pay as follows:

$$P(t_0) = \frac{pB}{(1+r)} \tag{3.4}$$

where 1+ r is the discount factor and r is interest rate. Insurance companies are assumed to collect the present value of premiums at time t_0 and invest it and distribute the earned return of interest rate r among beneficiaries at time $t_0+\Delta t_0$. In this case, in order to derive the demand function for life insurance we may utilize the following power utility function:

$$U(W) = -W^{-\gamma} \tag{3.5}$$

where $\gamma > 0$. Of course other utility functions may also be used, keeping in mind that any form of utility function has implications for absolute and relative risk aversion and consequently for the demand for insurance. This function is in line with the finding of Friend and Blume (1975) that households display constant relative risk aversion. This function implies constant relative risk aversion and income elasticity greater than unity. The empirical result in this chapter suggests that income elasticity is greater than unity. After employing the utility function (3.5) in the first order equation (3.2) and rearranging, instead of equation (3.3), we have:

$$B = \frac{(W_0 - C)(1+r)(A-1) + s(A-1) + Ay}{p(1+r)(A-1)+1} \tag{3.6}$$

where $A = \left[\frac{(1-p(1+r))\pi(t_0)dt\lambda\tilde{x}}{\tilde{x}p(1+r)(1-\pi(t_0)dt)} \right]^{\frac{1}{\gamma+1}}$

The derived demand function for life insurance depends on the level of saving, social security, the probability of death of the wage earner, wealth/income, risk aversion, the bequest intensity factor, inflation, interest rates, and the loading (e.g. risk premium, and administrative costs in excess of the expected loss). As a basis for a reduced form estimating equation, equation (3.6) may be written as:

$$B = f(y, \gamma, r, \pi, \lambda, Tel, InsQ, FD, Inf, Sav, SocS) \tag{3.7}$$

where InsQ, FD and Tel are institutional quality, financial development and telephone main lines indicators respectively and proxies for providing cost effective insurance. The derived demand function in equation (3.7) needs to incorporate informal risk sharing institutions (InfFins) (i.e., the extended family). Therefore, equation (3.7) may be modified to include this variable as follows:

$$B = f(y, \gamma, r, \pi, \lambda, Tel, InsQ, FD, Inf, InfFins, Sav, SocS) \tag{3.8}$$

The expected partial derivatives of equation (3.8) are as follows: $\partial q/\partial y>0$; $\partial B/\partial \gamma>0$; $\partial B/\partial r><0$; $\partial B/\partial \pi>0$; $\partial B/\partial \lambda \gtreqless 0$; $\partial B/\partial Tel>0$; $\partial B/\partial InfFins<0$; $\partial B/\partial InsQ>0$; $\partial B/\partial FD>0$; $\partial B/\partial Inf<0$; $\partial B/\partial Sav<0$; $\partial B/\partial SocS \gtreqless 0$.

The partial derivative with respect to income (y) is likely to be positive. Beenstock, Dickinson, and Khajuria (1986) suggest that income has positive impact on life insurance as household's income rises more coverage can be afforded, and that the higher household's income is the more hardship for offspring the loss of income is. The empirical result in this chapter suggests that the partial derivative with respect to income is positive.

The predicted sign of the partial derivative with respect to risk aversion (γ) is positive. Karni and Zilcha (1985), assuming state dependent utility, showed that the purchase of insurance coverage is related to the degree of risk aversion. Contrary to the theoretical prediction, the empirical finding in this chapter suggests that education either is statistically insignificant or negative and significant. One explanation may be that education is not an adequate proxy for risk aversion.

The sign of the partial derivative with respect interest rates (r) may be negative or positive. On the one hand, high interest rates provide more income to policy holders. On the other, high interest rates may make policy holders reduce their saving through life insurance. Therefore, the impact of interest rates *per se* on the demand for life insurance is likely to be ambiguous.

The predicted sign of the partial derivative with respect the probability of death of the wage earner (π) is positive. As life expectancy increases, the actuarial fair price decreases, which promote the demand for life coverage. However, the panel estimation results suggest that life expectancy is statically insignificant.

As the intensity for bequest, λ, depends on the average number of dependents, we hypothesise that the partial derivative with respect to mortality coverage will depend on the type of bequest motive. In the altruistic motive the partial derivative is predicted to be positive. However, in the bequest as exchange motive the partial derivative may be negative. The total effect in the demand function is therefore ambiguous. The empirical finding show that young dependency ratio is negative and statically significant in the sample of emerging and developing economies, positive and significant in highly industrialised countries, and no significant total impact.

By the same token, the partial derivative with respect to the longevity coverage will depend on the type of bequest (fertility) motive. In the bequest as exchange (old age security) motive parents expect to get support from their grown children, hence the partial derivative is negative. However, in the altruistic motive, the partial derivative is expected to be positive. Therefore, the overall effect is ambiguous. The empirical result is in line with the hypothesised prediction. Old dependency ratio is positive and significant in the complete dataset. However, the ratio is negative and significant in the sample of developing and emerging economies and positive and significant in the sample of highly industrialised economies.

The expected partial derivative with respect to insurance loading is negative. However, as we use the level of infrastructural development (Tel); financial development (FD) and institutional quality (InsQ) to indicate cost effective supply of insurance services, the expected signs of the partial derivatives with respect to physical infrastructural development, financial development, and institutional quality are positive. The empirical result lends support to the positive impact of infrastructural development on the demand for life insurance. However, financial development and institutional quality do not appear to have significant impact on the demand for life insurance.

The partial derivative with respect to the anticipated inflation (Inf) is expected to be negative. The empirical result is consistent with the prediction that inflation has negative impact on the demand for life insurance.

The partial derivative with respect to the extended family institution (InfFins) is hypothesised to be negative. The empirical finding in this chapter is in line with the hypothesised sign, i.e., the extended family institutions tend to be a substitute for formal life insurance.

The sign of the partial derivatives with respect to savings (Sav) is expected to be negative. Given consumer's limited budget, using alternative forms of saving is likely to be at the expense of saving in life insurance products.

The sign of the partial derivatives with respect to social security and welfare (SocS) is difficult to determine a priori. Regarding social security and welfare (SocS), ambiguity arises from the aggregated nature of the data, as some elements increase agents' income and promote life insurance purchase, others like survivor benefits substitute private mortality coverage. The empirical finding shows that social security and welfare appear to have positive and significant impact on the demand for life insurance.

Table 3-1 presents a summary of hypothesised signs of all explanatory variables and proxies used.

3.4.2. Econometric Specification

We use standard panel data analysis because it provides with more accurate inference of model parameters, and controls for omitted variables as well as measurement errors, Hsiao (2006). The estimation and statistical tests is based on the Common Correlated Effects Pooled (CCEP) method advanced by Pesaran (2006), i.e., we estimate the following equation after incorporating the unobserved common factor:

$$B_{it} = \alpha_i + \beta_i' X_{it} + h_i' W_t + e_{it} \tag{3.9}$$

where B_{it} denotes life insurance density (per capita) or life insurance penetration in the i^{th} country at time t, and is the dependent variable, and X_{it} is a vector of explanatory variables that include GDP per capita, institutional quality, financial development (liquid liability), infrastructural development (telephone mainline), life expectancy, risk aversion (education), the extended family institution (agriculture value added as a share of GDP) , social security as a percentage of GDP, gross savings as a percentage of GDP, mortality risk coverage (young dependency ratio), and longevity risk coverage (old dependency ratio) , α_i is a country specific intercept, β_i' is a vector of coefficients, and e_{it} is the error term, as well as $W_t = (\ln \overline{B}_t, \overline{X}_{it})'$, where $\overline{X}'_{it}$, and $\ln \overline{B}_t$ are cross section averages of the dependent and independent variables, respectively, (see ch.2 for detailed description of the CCEP).

In order to investigate cross section correlation in the data we use the average pairwise correlation coefficient and two diagnostic tests of cross-section dependence related to the average correlation coefficient, namely the Pesaran (2007) CD_ρ test and the CD_{LM} test suggested by Frees (1995), (see appendix B for details). We also test for the presence of spatial dependence using Moran's I test. In the computation of the Moran's I statistics we have adopted weights based on the inverse of the distance between capital cities expressed in latitude/longitude points and are represented by spatial weights matrix (Ω) with dimension N×N, (see chapter 2, pp.62-63 for details regarding the spatial weight matrix).

3.5. Data

3.5.1. Measures of the Price of Insurance and Data sources

The price of a life insurance policy consists of the expected loss (actuarially fair price) and a loading. Due to unavailability of data on the commercial price to us and following Outreville (1996), and Ward and Zurbruegg (2002) we use life expectancy to proxy for the fair price of insurance. Annual data on life expectancy is from the World Development Indicators (WDI) and U.S. Census Bureau, Population Division.

We also use the level of financial development, institutional and physical infrastructural development to indicate cost effectiveness in providing insurance services.

As a proxy for physical infrastructural development in a country we use fixed telephone mainlines subscribers (per 100 people). Annual data on telephone mainlines per 100 people is from the WDI.

As a measure of institutional quality we employ Polity IV institutional indicators published by the Centre for Systemic Peace's Polity IV project. We use Polity's indicators of institutionalized democracy and autocracy indicators as well as polity2 indicator.

As a measure of financial development we use liquid liability. Data on liquid liability expressed as a percentage of GDP obtained from WDI and Beck, Demirgüç-Kunt and Levine (2000). The authors indicate that liquid liability measures the overall size of the financial system in a country.

3.5.2. Measures of Bequest Intensity and Data sources

It is believed that the intensity of bequest depends on the number of one's dependents and their needs. Campbell (1980, p.1162) states that

"*household's intensity for bequest is likely to be a function of the age and number of dependents in the household, their future need of economic support, the probability of their future deaths, and psychological traits of the family: sense of moral responsibility, education and the like*."

A proxy for the average number of dependents used in the empirical work on the demand for life insurance is dependency ratio.[76] Beck and Webb (2003) used young dependency ratio for mortality risk and old dependency ratio for longevity risk. However, such a distinction is not found in other studies. Outreville (1996), Li et al (2007), and Chui, and Kwok, (2009) used the total dependency ratio.[77] Beenstock, Dickinson and Khajuria (1986), Browne and Kim (1993), and Ward and Zurbruegg (2002) used young dependency ratio. We believe that the distinction is important as on the one hand, we use aggregate premiums data, and on the other, we aim at uncovering whether types of bequest motives do matter. Therefore, we use young dependency ratio to proxy for mortality risk, and old dependency ratio to proxy for longevity risk. Note that although we use young (old) dependency ratio for mortality (longevity) coverage, we do not assume or conjecture that the ratios would be reflected in the purchase of life/annuity coverage. Annual data on young dependency ratio and old dependency ratio are from the WDI.

3.5.3. Measures of the Extended Family Institution and Data sources

Previous empirical studies did not incorporate the extended family institution in the demand for life insurance. A possibility is to classify economies to industrial and agrarian ones. It is based on the idea that industrialization created a structural change in the family. While in highly industrialized societies the nuclear family is the typical form, in agricultural societies the extended family prevails instead. The extended

[76]The World Bank Development Indicators report three dependency ratios. These are total age dependency ratio, young age dependency ratio, and old age dependency ratio as the proportion of dependents per 100 working-age population. The total age dependency ratio is defined as the ratio of people younger than 15 or older than 64--to the working-age population--those ages 15-64. Old age dependency ratio, is the ratio of people older than 64 to the working-age population. Young age dependency ratio, is the ratio of people younger than 15 to the working-age population.
[77] Wasow (1986), and Park, Borde and Choi, (2002) did not include dependency ratio, as the focus of the former study was how public policy affects the volume of insurance premiums, and the latter focused on the impacts of national culture on the degree of insurance pervasiveness.

family is responsible for providing shelter, food and clothing. It is likely that, the more industrial a society is the more it uses formal life insurance institution, and the more a society depends on agriculture the more likely is the extended family institution prevails. Agricultural sector includes forestry, hunting, fishing, cultivation of crops and livestock production. And since our interest is in having a proxy for the extended family institution, a possibility is the use of the share of agriculture in a country's GDP. The idea is that the more traditional a society is the more it depends on agriculture and vice versa. Therefore, we use the share of agriculture in a country's GDP as a proxy for the extended family institution. Data on agriculture value added to GDP is from WDI and United Nations Statistics Division.

3.5.4. Measures of Other Variables and Data sources

Existing empirical work uses mainly insurance density (premiums divided by population) and insurance penetration (premiums divided by GDP) as a measure of the demand for life insurance, due to data availability. In this study we also use insurance density, and insurance peneFtration. Data on insurance premiums (premiums /GDP) is obtained from Beck, Demirguc-Kunt, & Levine (2000).

As a measure of anticipated inflation existing empirical work tend to use a weighted average inflation. Beenstock, Dickinson and Khajuria (1986) used aggregate price level (consumer price index), Browne and Kim (1993) used average rate over the prior eight years as a proxy for the expected inflation. Li et al (2007) used average consumer price changes over five years as a proxy for anticipated inflation. Outreville (1996) used a weighted average of realized price changes over a five-year period as a measure of anticipated inflation. Ward and Zurbruegg (2002) used real inflation rate. Beck and Webb (2003) used average of the inflation rate in the current and following year, as a proxy for expected inflation rate. Notably, a weighted average inflation may be subjected to heuristic errors. Therefore, in this chapter as a measure of anticipated inflation, we use lag values of inflation rates. Annual data on consumer price index inflation is from the WDI.

As a measure of saving Wasow (1986) used saving as a percentage of GNP, and Beenstock, Dickinson and Khajuria (1986) used gross saving as a percentage of GDP. Beck and Webb (2003) used private savings as a share of gross national disposable income. In this chapter we use gross savings as percentage of GDP.[78] Annual data on gross savings as a percentage of GDP is from the WDI.

As a measure of real interest rate, Beenstock, Dickinson and Khajuria (1986) used real long-term yield on government bonds, Outreville (1996) used real discount rate, Beck and Webb (2003) used real average lending rate, if unavailable the discount rate. However, Li et al (2007) indicated that lending rates contain credit risk premiums, which depend on country's credit default experience, and therefore, they used, instead, the real yield on government bonds if unavailable money market rates. Other studies do not include real interest rate. In this chapter we use real deposit interest rates. Annual data on deposit interest rates is from the WDI

As a measure of social welfare and security previous empirical studies used aggregate public social welfare expenditure (see Beenstock, Dickinson and Khajuria, 1986; Browne and Kim, 1993; Outreville, 1996; Ward and Zurbruegg, 2002; Beck and Webb, 2003; and Li et al, 2007). In this chapter we also use public social welfare expenditure as a percentage of GDP. Data on social security and welfare are from the International Monetary Fund-Government Finance (IMF, GF).

[78] Data on private savings is unavailable to us

For income we use GDP per capita. Annual data on GDP per capita, at constant 2000 US dollars, is from the WDI.

Data on risk aversion is unavailable to us. Empirical work on the demand for life insurance often used the level of education to proxy for risk aversion (Browne and Kim, 1993; Outreville, 1996; Beck and Webb, 2003; Li et al, 2007; Ward and Zurbruegg, 2002). Browne and Kim (1993) suggested that the demand for life insurance is positively related to education. They argued that, on the one hand, schooling lengthens the period of dependency of offspring, and a higher level of education may lead to a greater degree of risk aversion and greater awareness of the benefits of insurance services, on the other. They used the ratio of total enrolment in third-level education. In this chapter, we use the gross enrolment ratio of secondary education as well as the gross enrolment of tertiary education to proxy risk aversion.[79] Data on educational secondary and tertiary gross enrolment ratio are all from WDI and United Nations Educational, Scientific and Cultural Organization (UNESCO) Annual Statistics.

3.5.5. Summary Statistics

In this chapter we utilize several data sets. A full dataset1 includes 98 industrialized and developing economies over the period 1960-2009 to investigate

[79] Wasow (1986), Browne and Kim (1993) Outreville (1996) and Beck and Webb (2003) suggest that risk aversion is related to the predominant religion in a country and that societies consume less life insurance in countries where the dominant religion is Islam. However, the low consumption may be attributable to the fact that conventional insurance policies/contracts do not take into account religious considerations. This may explain the emergence of Islamic life insurance services during the last decades. Although Islamic insurance industry is still in its infancy (it accounted for about 5% out of 11% of insurance premiums written in Muslim countries during 2004-2007, Swiss Re (2008, p.45), its presence indicates the importance of religion in Muslim societies. Therefore, we tend to classify religion as a cultural factor (see Stulz and Williamson, 2003), (or political factor as suggested by Ward and Zurbruegg, 2002), rather than a proxy for risk aversion. North (1997) noted that ideological attitudes and perceptions about fairness and justice that constitute individuals' frames of reference for political and individual choices do matter.

the long run economic relationship between the demand for life insurance services and its determinants. A limitation of the data is that it is unbalanced. Indeed, this limits conducting factor and spatial diagnostic tests that require balanced data. In order to conduct such diagnostic tests we use a dataset2 that includes, out of the full dataset, 53 developed and emerging economies over the period 1994-2006. Selection of countries and time interval were based on availability of all observations for all or most variables and remaining gaps were filled using data on a related relevant variable if not available an average value for adjacent years.[80]

In order to investigate the bequest motive we use, a dataset3 of developing economies; a dataset4 of highly industrialized advanced economies; and a dataset5 of transition economies. While the dataset of developing economies includes 56 countries over the period 1960-2009, the dataset of transition economies include 14 countries over the period 1986-2009, and the dataset of highly industrialized economies includes 26 countries over the period 1960-2009. List of countries for all datasets are in the tables of summary statistics.

Data sets 1, 2, 3, 4, and 5 are summarized in Tables 3-1A, 3-1C, 3-1E, 3-1G, and 3-1I, respectively. The tables provide the definition and source of all key variables, units of measurement, means, standard deviations (overall, between and within countries), and minimum and maximum values. The summary statistics show that there is between and within countries' variation, justifying the use of panel estimation techniques.

Moreover, the correlation coefficients matrices for datasets 1, 2, 3, 4, and 5 are presentenced in Tables 3-1B, 3-1D, 3-1F, 3-1H, and 3-1J, respectively. The

[80] For interest rate we used deposit interest rates and gaps were filled using Treasury bill rates, if unavailable (the case of Portugal and Austria) government bond yields. For inflation rates we used consumer price index and gaps were filled by GDP deflator inflation. We used lagged inflation rates with the exception for 1994 for which we used its annual value. For saving we used gross savings as a percentage of GDP and remaining gaps were filled using gross domestic savings as a percentage of GDP.

correlation coefficients between the dependent and independent variables are statically significant at least at 5 percent level of significance, and the signs of the coefficients, with the exception of real deposit interest rate, autocracy indicator, young dependency ratio, are consistent with theoretical predications.

3.6. Diagnostic Tests and Estimation Results

3.6.1. Cross Section Dependence Test Results

In order to investigate cross section dependence we utilize Cross section Dependence Lagrange Multiplier (CD_{LM}) test suggested by Frees (1995) and Pesaran Cross section Dependence (CD_{ρ}) test.

As the dataset1 is unbalanced, it was not possible to conduct the test for all variables. Therefore, we utilize the dataset2 of 53 developed and emerging economies over the period 1994-2006.[81] Table 3-2 displays the average correlation coefficient of variables expressed in the first difference and regressed on a country specific intercept. Test results suggest that the presence of cross-section correlation between pairs of countries for insurance density, insurance penetration, GDP per capita, telephone mainlines, agriculture value added, education indicators, life expectancy, and liquid liability. The test does not provide results for variables autocracy, democracy and polity2.

Both Pesaran CDρ test and CD_{LM} reject the null hypothesis of cross section independence. The only difference in the results are that while Pesaran CDρ test suggest cross section dependence in all variables, the CD_{LM} test suggest that cross section dependence in all variables but agriculture value added and life penetration.

[81] Note that per capita insurance premiums, insurance penetration, and per capita GDP are in natural logarithm. Other variables are in levels as they are expressed in percentage.

For these two variables the CD_{LM} test fails to reject the null hypothesis of cross section independent. Average correlation varies between variables from 0.646 in young age dependency ratio and 0.603 in old age dependency ratio to 0.246 in life penetration and 0.243 in social security and agriculture value added. Correlation figures for other variables are between that of age dependency ratios and social security.

By the same token, the Moran's I test rejects the null hypothesis of global spatial cross section independence. The Moran's I test is computed on variables in levels.[82] It indicates the presence of spatial cross section dependence in all variables, but not agriculture value added, inflation, real interest rate, and autocracy.

3.6.2. Nonstationarity of Life Insurance Indicators and its Determinants

We conducted two diagnostic tests for the presence of unit root in panel dataset1, namely Fisher-type unit root test for panel, the Maddala and Wu-Phillips-Perron (PP) test and Pesaran (2007) unit root test for heterogeneous panel data (CIPS). As the Maddala and Wu test assumes cross section independence test results are reported for comparison. The analysis and conclusions are based on the CIPS test as the test accommodates for possible cross-section dependence.

The results of Maddala and Wu- Phillips-Perron unit root test are presented in Table 3-3. The test shows that, telephone mainlines, polity2, GDP per capita, tertiary education enrolment ratio, life density, life penetration, telephone mainlines, and liquid liability, are nonstationary in levels and stationary in first difference. The test also shows that autocracy, democracy, old dependency ratio, agriculture value added, saving, inflation, secondary schooling, interest rates, and social security and welfare

[82] The test does not provide results for the variables in first difference.

are all stationary in levels. The test also shows that young dependency ratio is nonstationary with an intercept only. By contrast, life expectancy is nonstationary with an intercept and a trend. On the other hand, the test indicates that variables in the first difference are stationary as shown in Table 3-3.

Table3-4 reports the results of CIPS test for variables in levels. The test shows that GDP per capita, liquid liability, telephone mainlines, life expectancy, social security and welfare, educational indicators (secondary enrolment ratio, and tertiary enrolment ratio), autocracy, life density, and life penetration, are all nonstationary. Democracy, polity2, saving, inflation, interest rates, old dependence ratio, young dependency ratio and agriculture value added are all stationary.

Table 3-4 presents also results of the CIPS test for variables in the first difference. It suggests that stationarity of all variables in the first difference.

To sum up, the CIPS test indicates nonstationarity of several variables in levels and stationarity of all variables in the first difference.

All in all, the results of the test suggest that we need to take into account the presence of non-stationarity in the data under consideration, i.e., to test for cointegration between life insurance consumption and its hypothesised determinants.

3.6.3. Cointegration Analysis

The possibility of cointegration between life insurance demand indicators and its determinants is investigated using the Kao (1999) test, Pedroni (2004) test, and the $CADFC_p$ test advanced by Banerjee and Carrion-i-Silvestre (2011). All three tests are residual based tests. However, unlike the $CADFC_{p,}$ both the Kao test and Pedroni test assume cross section independence in the data. Therefore, before employing the Kao and Pedroni tests the data is demeaned, detrended, detreded and demeaned to remove possible cross section dependence in the data. By contrast, the $CADFC_p$ test is employed on original data. Moreover, we have conducted individual country unit root test using the Phillips-Perron (PP) unit root tes.[83] Consequently, the number of countries included in the cointegration test is a sample of 55 countries over the period 1960-2009. Results of the CIPS unit root test for the sample is presented in Table 3-5. The results show that life density, life penetration, saving, GDP per capita, autocracy, real interest rates, educational indicators, social security and welfare, telephone mainlines, liquid liability and life expectancy are non stationary in levels and stationary in the first difference. Democracy and agricultural value added are stationary with only a constant and nonstationary with a constant and a linear trend. Old and young dependency ratios are stationary.

A summary of the results of cointegration test are displayed in Table 3-6A. The Kao test the $CADFC_p$ test results show the presence of a long run relationship between life insurance indicators and its determinants. The Pedroni test results using detrended, and detrended and demeaned data also show a long run relationship.[84] In order to estimate the long run relation parameters we use the CCEP method. The results are presented in section 3.6.5.

[83] We conducted individual country unit root test using the PP and in some cases the ADF unit root tests on life insurance density, life insurance penetration and GDP per capita. We found that life insurance premiums are stationary for some countries and nonstationary for others. We also found GDP per capita is stationary for some countries and nonstationary for some others. Based on the results we included countries for which both life insurance premiums and GDP per capita are nonsationary, and discarded others. The results of individual country unit root test are not reported here.

[84] The Pedroni test includes seven test statistics. Pedroni (1997) conducted Monte Carlo simulations and he found that in terms of power among the seven statistics the group ADF performs very well and better than the other statistics. Pedroni (1997) shows that the panel-ADF and group-ADF statistics have better small sample properties than the other statistics and hence they are more reliable. For this reason, and for comparability with other tests, we have only reported the group ADF Pedroni cointegration tests.

3.6.4. Error Correction Model

As we have established the long-run relationship between the indicators of the demand for life insurance and its determinants, we now turn to the estimation of the following error correction model:

$$\Delta B_{it} = \alpha_i + \phi_i (B_{i,t-1} - \hat{\beta} X_{t,t-1}) + \sum_{j=1}^{p} \varphi_i \Delta B_{i,t-j} + \sum_{j=1}^{p} \gamma_i \Delta X_{i,t-j} + \varepsilon_{it} \tag{3.10}$$

where Δ denotes the first difference operator, in the parenthesis we have the previous period's error term and is the number of lags. The coefficient ϕ_i measures the speed of adjustment of life insurance penetration/density to a deviation from the long-run equilibrium relation between life insurance consumption and its determinants. We use the CCEP method in estimating equation (3.10) and the sample of 55 countries over the period 1960-2009.[85] In estimating the CCEP, unobserved factors were approximated by $\Delta\overline{B}_t, \Delta\overline{B}_{t-1}, \Delta\overline{\mathrm{X}}_{\mathrm{t\text{-}1}}$ and $\overline{\mathrm{B}}_{t-1} - \hat{\beta}\overline{X}_{t-1}$, where $\hat{\beta}$ are the estimated coefficients in all regressions.

Estimation results are displayed in Table 3-6B. The results show that the error correction term is statistically significant and has the expected negative sign in both specifications. Notably, besides GDP per capita, the dependent variable in prior periods in each specification, have significant impact on the dynamic adjustment.

3.6.5. Panel Estimation Results

Estimation results of the fixed effects model 1-12 are in Table 3-7A. While the dependent variable in regressions 1-6 is life density, the dependent variable in regressions 7-12 is life penetration. All specifications results show that life insurance consumption is positively related to GDP per capita, old dependence ratio,

[85] It is the same sample used for investigating cointegration between life insurance and its determinants.

infrastructural development, social security and welfare, and negatively related to young dependence ratio, agriculture value added, saving, and inflation. Other variables are all statistically insignificant. As the fixed effects method is biased in the presence of unobserved common factors the results are reported for comparison purposes and the discussion will focus on the CCEP results.

Estimation results of the CCEP 13-24 are presented in Table 3-7B. The results show that life insurance density is positively related to GDP per capita, and income elasticity of 1.763 is greater than unity. It suggests that a 1 percent increase in real GDP per capita increases life insurance consumption per capita by 1.76 percent, indicating that life insurance is a superior good. The result is in line with Beck and Webb (2003) panel results using life insurance density as the dependent variable. They reported income elasticity of 1.471. By contrast, estimation results of life penetration as the dependent variable in Table 3-7B show income elasticity less than unity. The results are also in line with the findings of Beck and Webb (2003) panel estimation using life penetration as the dependent variable. Similarly the result of cross section OLS regression in Table 3-7C also suggests income elasticity less than unity in the life density model, which is in line with other cross section studies (see Browne and Kim, 1993; and Outreville, 1996).

A plausible explanation for the discrepancies is that income elasticity may be sensitive to the model used. Indeed, Ward and Zurbruegg (2002) and Li et al (2007) report income elasticities that vary significantly across models depending on the explanatory variables used. Nevertheless, it is most likely that income elasticity with respect to life insurance is greater than unity, i.e., life insurance is more likely to be a superior good. This implies that, on the one hand, panel estimation results in general and the CCEP estimation results in particular are more consistent than simple OLS cross section. On the other, although results of the CCEP life penetration models are significant, the results of life density models are appealing.

The CCEP results show that life insurance density is positively related to old dependence ratio. The coefficient of old dependency ratio is about 0.0314, suggesting that a 1 percent increase in the ratio of the old population to the working age population increases life insurance density by 3.14 percent. This is much less than the coefficient of 1.73 reported by Beck and Webb (2003, table 5, col. 1). A plausible explanation for the discrepancy may be that they used the fixed effects estimator which is biased.

Life insurance density is also positively related to infrastructural development in a country. The size of the coefficient is 0.0185. It suggests that an increase by a telephone mainline (per 100 people), generates 1.85 percent increase in life insurance density. The result is in accord with the hypothesised positive effect of infrastructural development on life insurance consumption. It is likely that infrastructural development results in lower cost of providing insurance services, hence the positive impact on the demand for life insurance.

Life insurance density is also positively associated with social security and welfare, which suggests that social welfare and benefits represent a family asset that contributes positively to the demand for life insurance consumption. The size of the coefficient of 0.0342 indicates that a 1 percent increase in social security and welfare generates a 3.4 percent increase in life insurance consumption. The result is in line with Browne and Kim (1993). However, this is in contrast to the findings of Beenstock, Dickinson, and Khajuria (1986), Ward and Zurbruegg (2002) and Li et al (2007) who reported a negative relationship between life insurance consumption and social security; and Beck and Webb (2003) and Outreville (1996) who did not find any statistically significant relationship between life insurance and social security. In our OLS cross section regression social security and welfare is also insignificant, suggesting that the discrepancies in empirical studies may be attributable to the use of different data sets and estimation techniques. A difficulty associated with using aggregate data is in separating positive wealth effects of social security and welfare on life insurance from negative effects of survivor benefits.

Life insurance consumption per capita is negatively related to the extended family institution indicator (agriculture value added), suggesting that the extended family may function as a substitute for life insurance consumption. The size of the coefficient of -0.0117 indicates that a 1 percent decrease in the ratio of agriculture value added to GDP generates 1.17 percent increase in life insurance consumption.

Life insurance consumption is negatively related to saving confirming the hypothesis that savings represents an alternative mechanism/substitute for life insurance saving. The size of the coefficient of -0.00644 suggests a 1 percent decrease in the ratio of gross saving to GDP generates an increase in life insurance consumption by 0.644 percent. The result is in line with Wasow (1986) who reported negative and significant impact of gross domestic saving on life insurance premiums. In contrast, Beck and Webb (2003) found a positive relationship between life insurance penetration and private saving. The divergence between the results is possibly attributable to the different proxies used for private saving in the two studies.

Inflation is significant and negatively related to life insurance suggesting that consumers take into account not only mortality risk but also purchasing power risk when deciding on the purchase of insurance. The finding is consistent with Beenstock, Dickinson, and Khajuria (1986), Wasow (1986), Browne and Kim

(1993), Outreville (1996), Ward and Zurbruegg (2002), Beck and Webb (2003), Li et al (2007) and Park and Lemaire (2011) who reported negative and significant impact of inflation/anticipated inflation on life insurance consumption.

Risk aversion indicator (tertiary education) is significant and negatively related to life insurance. The negative sign of tertiary education does not support the hypothesised positive sign. It suggests that risk aversion decreases with more education. A possibility is that third level education is not an adequate proxy for risk aversion as noted by Browne, Chung and Frees (2000). They also found a negative relationship between general liability insurance and tertiary education.

Estimation results suggest that young dependency ratio, financial development indicator (liquid liability), life expectancy, real deposit interest rates, institutional quality indicators (autocracy, democracy, polity2) and risk aversion indicator (gross secondary enrolment ratio) have no significant impact on life insurance density.

Generally, the CCEP results using life insurance penetration as the dependent variable, with some variations in the coefficients, are in line with estimation results using life density as the dependent variable. It shows that life insurance penetration is positively related to GDP per capita, old dependence ratio, infrastructural development, and social security and welfare. Life insurance penetration is negatively related to the extended family institution indicator (agriculture value added), savings, inflation, and risk aversion indicator (tertiary education indicator). Other variables are all statistically insignificant.[86]

[86] Note that in ch.4 in this thesis we investigate the relationship between life insurance development and private credit. In deriving the theoretical model in ch.4, we assume a consumer without bequest motive. This seems reasonable, as a consumer with bequest motive who buys life insurance can use the policy to obtain credit, for instance permanent life insurance policies. However, in order to check the robustness of the results here, we run a regression including private credit the results of which are in Table 4.9. It shows that in the specification with private credit, saving and tertiary education are statistically insignificant. The results for other variables statistically remain the same.

We also tested the impact of religion on life insurance using OLS cross section regressions.[87] The results are in Table 3-7C. It indicates that life insurance consumption is less in Orthodox and Muslim population dominant countries. The result, regarding Muslim dominant societies, is consistent with the hypothesised impacts of Islamic religion, and the findings of Wasow (1986), Browne and Kim (1993), Ward and Zurbruegg (2002), and Beck and Webb (2003). These studies, however, did not test the impacts of Orthodox faith on life insurance consumption. Moreover, the OLS results suggest that legal socialistic origin has negative and significant impact on life insurance consumption. The OLS results also show that life insurance is positively related to GDP per capita and financial development, and negatively related to life expectancy[88], inflation and the extended family institution.[89]

All in all, the results suggest that life insurance consumption across countries may be explained by GDP per capita, the extended family institution, infrastructural development, old dependency ratio, social security and welfare, gross savings, anticipated inflation, risk aversion, and Islam and Orthodox being the dominant religions in a country.

3.6.6. Investigating Bequest Motives

The CCEP estimation results in Table 3-7B suggest that the bequest intensity indicator (young dependency ratio) is insignificant with a negative sign. The result is similar to that reported by Beck and Webb (2003). Unlike our study and Beck and

[87] Wasow (1986), and Browne and Kim (1993), and Ward and Zurbruegg (2002) used a dummy variable for Muslim countries, Outreville (1996) used the percentage of Muslim population. Beck and Webb (2003) used the ratio of adherents of a religion to the entire population for testing the effects of different component of religions. We have used the percentage of each religion followers in a country, and legal origin dummies, as well as an average of 1989-2009 for all variables.

[88] The negative sign of life expectancy is in line with the findings of Li et al (2007).

[89] Variables telephone mainlines; interest rates, social security, old and young dependency ratios, gross domestic saving, and other legal origins were insignificant. We also experimented with institutional quality indicators (autoc, democ, polity2) and they were insignificant, the results are not reported here.

Webb (2003), other studies do not distinguish between mortality risk coverage proxied by young dependency ratio and longevity risk coverage proxied by old dependency ratio though they use aggregate data premiums. Browne and Kim (1993) cross section study reported positive and significant coefficient of young dependency ratio. Ward and Zurbruegg (2002) reported positive impact of young dependency ratio on life insurance consumption in the OECD sample and negative impact in the Asia sample.[90] Ward and Zurbruegg (2002) indicated that the negative sign in the Asia sample is attributable to young adult growth, over the period of their investigation, associated with few family commitments.

Although Ward and Zurbruegg's explanation sounds plausible, one may go further to consider the possibility that households may have different types of bequest motive. Therefore, in order to investigate whether types of bequest motives do matter for life insurance consumption we classified countries into (i) developing economies, (ii) industrialized (transition) economies and (iii) highly industrialized economies. While the sample of developing economies includes 56 countries, the sample of industrialized transition economies include 14 countries. The sample of highly industrialized economies includes 26 countries. The division of countries to (highly) industrialized and developing countries is inspired by the World Bank's classification of economies. We study the behaviour of the coefficient of young dependency ratio in these three groups of countries.

We first analyze estimation results of developing economies. Table 3-8A and Table 3-8B presents estimation results of the fixed effects and the CCEP,

[90] Other studies used different dependency ratios. Beenstock, Dickinson, and Khajuria (1986) use a dependency ratio of population in age group 0-14 to the age group 25-54 and found positive and significant impact of the dependency ratio on life insurance consumption. Li et al (2007) used total dependency ratio and report positive and significant impact on life insurance consumption. In contrast, Outreville (1996) report insignificant impact of total dependency ratio on life insurance consumption.

respectively. Controlling for other factors, the coefficient of young dependency ratio is negative and statistically significant in both fixed effects and CCEP method. Similarly, the coefficient of longevity risk/ old dependency ratio is negative and statistically significant. The results are in line with hypothesized effects of the bequest as exchange motive on life insurance and annuities consumption, and suggest the presence of the bequest as exchange motive. It also provides some evidence for the old age security hypothesis.

Estimation of the fixed effects and the CCEP results of the sample of highly industrialized economies are displayed in Table 3-9A and Table 3-9B respectively. Young dependency ratio is positive and weakly significant. Old dependency ratio is also positive and significant. Interpretation of the results suggests the presence of altruistic motive in highly industrialized countries.

For the sample of transition economies estimation results of the fixed effects are in Table 3-10A and that of the CCEP are in Table 3-10B. Young dependency ratio is insignificant. By contrast, old dependency ratio is positive and weakly statistically significant in the fixed effects model. However, the ratio is insignificant in the CCEP model. A plausible explanation is that other factors than the bequest motive may determine fertility and demographics in these countries. Soubbotina and Sheram (2000, pp. 20-21) indicate that in the 1990s, (the period for which the data under investigation) in many transition countries birth rates have dropped sharply, and death rates among adults increased sharply. According to the authors the reason is believed to be economic uncertainties associated with the transition era.

This may suggest that societies are likely to have different types of bequest motives and the coefficient may be of opposite sign for different groups of countries. When countries are grouped in one group opposite signs are likely to cancel each other and become insignificant, or dominate one group another group. This may explain the findings that young dependency ratio is insignificant (reported by Beck and Webb (2003) and confirmed by our CCEP estimation results in Table 3-7B) using a dataset of developing and developed countries. The results suggest that (different groups of) countries may have different bequest motives, which is likely to have heterogeneous implications for the demand for life insurance.

3.7. Conclusions

This chapter examined the long run economic relationship between the demand for life insurance and its determinants, using a panel data analysis and a dataset of 98 countries over the period 1960-2009.

We conducted two diagnostic tests for the presence of unit root in the data, namely Fisher-type unit root test for panel, the Phillips-Perron (PP) test and Pesaran (2007) unit root test for heterogeneous panel data (CIPS). Results of the latter test suggest nonstationarity of the dependent variables and some of the regressors in levels and stationarity in the first difference.

Estimation results suggest that life insurance consumption variation across countries may be explained by GDP per capita, the extended family institution, infrastructural development, old dependency ratio, social security and welfare, gross savings, anticipated inflation and risk aversion.

As estimation results from the full dataset of developing and developed countries suggest that young dependency ratio is insignificant, the chapter also sheds light on whether types of bequest motives may have implications for life insurance consumption variations across countries.

In order to investigate whether bequest motives do matter we classified the countries into (i) developing economies, (ii) industrialized (transition) economies and (iii) highly industrialized economies. We study the behaviour of the coefficient of young dependency ratio in these groups of countries. For developing economies, estimation results suggest that, the coefficient of young dependency ratio is negative and statistically significant. By contrast, estimation results of the sample of highly industrialized economies suggest that the ratio is positive and weakly significant. For transition economies the ratio is insignificant.[91] The results suggest that (different groups of) countries may have different bequest motives and that may have implications for the demand for life insurance. That is, societies are likely to have different types of bequest motives and the coefficient of young dependency ratio may be of opposite signs for different groups of countries. When countries are grouped in one group the coefficients are likely to cancel each other and become insignificant, or dominate one group. Interpretation of the results suggest the presence of altruistic motive in highly industrialized countries and the presence of the bequest as exchange motive in developing societies.

The results are consistent with the prediction of theory of the demand for life insurance for a consumer with a bequest motive, on the one hand. That is, a positive relationship between life insurance consumption and bequest motive. Nevertheless, types of bequest motives do also matter for the demand for life insurance. The results are also in line with observed actual mortality and longevity risk management both in developing and developed countries, on the other hand.

The possibility of cointegration between life insurance demand indicators and its determinants are investigated using the Kao test, Pedroni, and $CADFC_p$ test advanced by Banerjee and Carrion-i-Silvestre (2011). Test results show that a long run relationship is to be expected.

We also investigated the dynamics of the demand for life insurance and its determinants using an error correction model. Estimation results suggest that the error correction term is significant and has the expected negative sign. The results suggest that, GDP per capita, life density, and life penetration in previous periods have significant impact on the dynamic adjustment.

[91] The question is what life insurance consumption may explain in transition economies. A plausible explanation is credit consumption.

Appendix D

Solution of the demand for life insurance under imperfect information and transaction costs

$$\underset{B}{Max}\, EU = \{\pi(t_0)dt\lambda V(\tilde{x}W_l) + (1-\pi(t_0)dt)U(\tilde{x}W_n)\}$$

$W_l = (W_0 - C - pB)(1+r) + B + s$ and $W_n = (W_0 - C - pB)(1+r) + y + s$

$U(W) = -W^{-\gamma}$

$$\underset{B}{Max}\, EU = \begin{cases} \pi(t_0)dt\lambda(-\tilde{x}((W_0 - C - pB)(1+r) + B + s)^{-\gamma} + \\ (1-\pi(t_0)dt)(-\tilde{x}((W_0 - C - pB)(1+r) + s + y)^{-\gamma}) \end{cases}$$

$$\frac{dE(U)}{dB} = 0$$

$$(1-p(1+r))\pi(t_0)dt\lambda(\gamma\tilde{x}(W_0 - C - pB)(1+r) + B + s)^{-\gamma-1}$$
$$-\, p(1+r)(1-\pi(t_0)dt)(\gamma\tilde{x}(W_0 - C - pB)(1+r) + s + y))^{-\gamma-1}) = 0$$

$$(1-p(1+r))\pi(t_0)dt\lambda(\gamma\tilde{x}(W_0 - C - pB)(1+r) + B + s))^{-\gamma-1}) =$$
$$p(1+r)(1-\pi(t_0)dt)(\gamma\tilde{x}(W_0 - C - pB)(1+r) + s + y)^{-\gamma-1})$$

$$\frac{(1-p(1+r))\pi(t_0)dt\lambda\tilde{x}}{((W_0 - C - pB)(1+r) + B + s)^{\gamma+1}} = \frac{\tilde{x}p(1+r)(1-\pi(t_0)dt)}{((W_0 - C - pB)(1+r) + s + y)^{\gamma+1}}$$

$$\frac{(1-p(1+r))\pi(t_0)dt\lambda\tilde{x}}{\tilde{x}p(1+r)(1-\pi(t_0)dt} = \frac{((W_0 - C - pB)(1+r) + B + s)^{\gamma+1}}{((W_0 - C - pB)(1+r) + s + y)^{\gamma+1}}$$

$$\frac{(W_0 - C - pB)(1+r) + B + s}{(W_0 - C - pB(1+r) + s + y} = \left[\frac{(1-p(1+r)\pi(t_0)dt\lambda\tilde{x}}{\tilde{x}p(1+r)(1-\pi(t_0)dt)}\right]^{\frac{1}{1+\gamma}}$$

Assume $A = \left[\frac{(1-p(1+r))\pi(t_0)dt\lambda\tilde{x}}{\tilde{x}p(1+r)(1-\pi(t_0)dt)}\right]^{\frac{1}{1+\gamma}}$ then

$$A = \frac{(W_0 - C - pB)(1+r) + B + s}{(W_0 - C - pB)(1+r) + s + y}$$

$$A((W_0 - C - pB)(1+r) + s + y)) = (W_0 - C - pB)(1+r) + B + s)$$
$$A(W_0 - C)(1+r) + As + Ay = ApB(1+r) + (W_0 - C - pB)(1+r) + B + s$$

$$A(W_0 - C)(1+r) + As + Ay - s - (W_0 - C)(1+r) = ApB(1+r) - pB(1+r) + B$$
$$(W_0 - C)(1+r)(A-1) + s(A-1) + Ay = B(Ap(1+r) - p(1+r) + 1)$$
$$B = \frac{(W_0 - C)(1+r)(A-1) + s(A-1) + Ay}{Ap(1+r) - p(1+r) + 1}$$

$$B = \frac{(W_0 - C)(1+r)(A-1) + s(A-1) + Ay}{p(1+r)(A-1) + 1}$$

Appendix E

Table3- 1 Summary of Hypotheses for Life Insurance Consumption

Variable/hypotheses	proxies	Partial expected effect on life insurance		Total expected effect on life insurance consumption
Income	GDP per capita	NPA		positive
Risk aversion	Secondary enrolment ratio/ tertiary enrolment ratio	NPA		positive
Physical infrastructural development	Telephone main lines	NPA		positive
Fair price of insurance	Life expectancy	NPA		positive
Financial development/ return on investment	Liquid liability	NPA		positive
Institutional quality	Democracy/Autocracy/Polity2	NPA		positive
The extended family institution	Agriculture value added (% of GDP)	Substitute	-ve	negative
Mortality risk coverage	Young dependency ratio	Altruistic bequest motive: more offspring more coverage	+ve	ambiguous
		Bequest as exchange /old age security motive: more offspring less coverage	-ve	
Longevity risk coverage	Old dependency ratio	Altruistic bequest motive: more old people more longevity coverage	+ve	ambiguous
		Bequest as exchange/ old age security motive: more old people more offspring but no increase in longevity coverage	-ve	
Private Saving	Gross savings as % of GDP	NPA		negative
Social security	Social security and welfare as % of GDP	Social security & welfare that increase households' income while the breadwinner alive	+ve	ambiguous
		Survivor benefit	-ve	
Anticipated inflation	Lag value of CPI	NPA		negative
Real interest rates	Real deposit interest rate	NPA		ambiguous

NPA= No prior assumption

Table3-1 A: Summary Statistics of Dataset1of 98 Countries over 1960-2009

Variable	Label	Source	Measure of/Proxy for	Mean	Overall St. Dev.	Between St. Dev.	Within St. Dev.	Min	Max	Obs.
premiums/GDP	lifpen	Beck, Demirguc-Kunt, & Levine (2000)	Insurance penetration	0.019416	0.030384	0.021523	0.020553	0.000035	0.357356	N = 2529
(premiums/GDP)*(per capita income (US$ 2000 constant) alternative (Premiums/GDP)*GDP/Population)	lifden	Beck, Demirguc-Kunt, & Levine (2000), and Swiss Re/WBI	Insurance density	386.342	1166.639	706.2789	878.3429	0.012218	19114.17	N = 2463
GDP and per capita income (US$ 2000 constant)	gdppc	WDI	Income	7819.83	9204.212	8389.786	3996.043	72.32493	59182.83	N = 4211
Agriculture value added %of GDP (Agriculture, hunting, forestry, fishing)	agva	UN Statistics	The extended family institution	12.40533	10.83835	9.003395	5.706728	0.043773	74.23312	N = 4041
Liquid liability	liql	WDI and Beck,Demirguc-Kunt, & Levine (2000)	Financial development	68.75402	379.6135	97.5217	365.4649	1.866373	15346.15	N = 4017
Gross secondary education enrolment ratio	sches	WDI and UNESCO annual statistics	Risk aversion	68.25656	33.98789	23.62604	24.65226	0.5959	1103	N = 3422
Gross tertiary education enrolment ratio	schet	WDI and UNESCO annual statistics	Risk aversion	23.7759	19.76474	15.0021	13.48576	0	98.09171	N = 3044
Telephone mainlines per (100)	tel	WDI	Infrastructural development	19.34086	18.56824	15.94985	9.436711	0.020773	74.46233	N = 3587
Age dependency ratio, old (% of working-age population)	agdo	WDI	Longevity risk coverage	11.88269	6.44994	6.118782	2.137362	1.248654	33.91994	N = 4897
Age dependency ratio, young (% of working-age population)	agdy	WDI	Mortality coverage	54.90206	23.33713	20.18862	11.86905	15.94799	108.0149	N = 4897
Gross savings (% of GDP)	gsav	WDI	Savings	22.58278	10.31527	7.195872	8.014334	-233.923	74.35326	N = 2861
Inflation, consumer prices (annual %)	infcp	WDI	Inflation	30.63749	434.1515	90.96418	425.6069	-21.675	24411.03	N = 3911
Life expectancy at birth, total (years)	lifex	WDI	Fair price	67.32532	9.034585	7.265758	5.27711	37.87134	82.58756	N = 4546
Social Security and welfare (% of GDP)	socs	IMF-GFS	Wealth/survivor benefit	8.018567	6.499165	5.93866	2.493006	0	28.90926	N = 2513
Real deposit interest rate (%)	readir	WDI	interest rate	0.385578	6.885166	1.102049	6.802466	-258.574	144.7664	N = 2540
democracy	dem	Polity IV Project,	institutional quality	5.217249	4.316304	3.666167	2.288519	0	10	N = 4267
autocracy	autoc	Polity IV Project,	institutional quality	2.790251	3.564136	2.964993	2.016297	0	10	N = 4267
Polity2	polity2	Polity IV Project,	institutional quality	2.433763	7.652017	6.502283	4.076373	-10	10	N = 4265

Countries, N: 98, Algeria, Argentina, Australia, Austria, Bahrain, Bangladesh, Barbados, Belgium, Botswana, Brazil, Bulgaria, Cameroon, Canada, Chile, China Colombia, Costa Rica, Côte d'Ivoire, Croatia, Cyprus, Czech Republic, Denmark, Dominican Republic, Ecuador, Egypt, El Salvador, Estonia, Finland, France, Germany , Greece, Guatemala, Honduras, Hong Kong, Hungary, Iceland, India, Indonesia, Iran, Iraq, Ireland, Israel, Italy, Jamaica, Japan, Jordan, Kazakhstan, Kenya, Korea, Kuwait, Latvia, Lebanon, Libya, Lithuania, Luxembourg, Malaysia, Malta, Mauritius, Mexico, Morocco, Namibia, Netherlands, New Zealand, Nigeria, Norway Oman, Pakistan, Panama, Paraguay, Peru, Philippines, Poland, Portugal, Qatar, Romania, Russian, Saudi Arabia, Singapore, Slovak, Slovenia, South Africa, Spain, Sri Lanka, Sweden, Switzerland, Syrian, Thailand, Trinidad and Tobago, Tunisia, Turkey, Ukraine, United Arab Emirates, United Kingdom, United States, Uruguay, Venezuela, Vietnam and Zimbabwe.

Table3-1 B : Correlation Matrix for Dataset1 of 98 Countries over 1960-2009

	lifpen	lifden	gdppc	agva	liql	sches	schet	tel	agdo	agdy	gsav	infcp	lifex	socs	readir	democ	autoc	polity2
lifpen	1																	
lifden	0.8744***	1																
gdppc	0.5733***	0.5964***	1															
agva	-0.3607***	-0.2839***	-0.5985***	1														
liql	0.2479***	0.293***	0.0536***	-0.0659***	1													
sches	0.3065***	0.2169***	0.5211***	-0.5621***	0.0233	1												
schet	0.312***	0.2312***	0.5238***	-0.4905***	0.0096	0.6362***	1											
tel	0.4685***	0.4081***	0.8224***	-0.6233***	0.0572***	0.6602***	0.7208***	1										
agdo	0.2981***	0.2856***	0.5885***	-0.4224***	0.027*	0.5581***	0.6086***	0.7371***	1									
agdy	-0.325***	-0.2635***	-0.6109***	0.6066***	-0.0186	-0.6887***	-0.6208***	-0.7519***	-0.7571***	1								
gsav	0.0964***	0.1079***	0.144***	-0.2034***	0.1001***	0.0427**	-0.0694***	0.0308	-0.0808***	-0.0997***	1							
infcp	-0.0637***	-0.0397*	-0.0572***	0.0158	-0.0117	-0.0194	-0.005	-0.0446**	-0.0158	0.0119	-0.0405**	1						
lifex	0.2889***	0.2942***	0.6163***	-0.7188***	0.0478***	0.6717***	0.6319***	0.7386***	0.6257***	-0.7877***	0.0619***	-0.0535***	1					
socs	0.2398***	0.2484***	0.5214***	-0.5077	0.1875***	0.4935***	0.5084***	0.682***	0.8509***	-0.6752	-0.104	-0.0331	0.5672***	1				
readir	0.026	0.0074	0.0009	-0.0004	0.0089	-0.0008	-0.023	0.0034	-0.013	-0.0067	0.0053	-0.0051	-0.0018	0.0021	1			
democ	0.3706***	0.3388***	0.4511***	-0.391***	0.0435***	0.4524***	0.5066***	0.5839***	0.6035***	-0.5136***	-0.1253***	-0.0179	0.5194***	0.5508***	-0.0056	1		
autoc	-0.3037***	-0.2457***	-0.2691***	0.2357***	-0.0348)**	-0.3501***	-0.4285***	-0.4195***	-0.4898***	0.4003***	0.1627***	0.0001	-0.4004***	-0.4086***	0.0047	-0.8814***	1	
polity2	0.3541***	0.308***	0.381***	-0.331***	0.0408**	0.4181***	0.4836***	0.5242***	0.5687***	-0.4765***	-0.1475***	-0.0104	0.48***	0.5055***	-0.0053	0.9741***	-0.964***	1

"***","**" and "*" indicate significance at 1%, 5% and 10% respectively

Table3-1 C: Summary Statistics of Balanced Dataset2 of 53 Countries over 1994-2006

Variable	Mean	Overall Std. Dev.	between Std. Dev.	within Std. Dev.	Min	Max	Observations	
lifpen	0.0269181	0.030269	0.029288	0.008565	0.0001	0.169401	N =	689
lifden	508	791.5158	758.9904	245.9239	0.402883	5320.931	N =	689
gdppc	11384.11	10496.08	10497.97	1372.023	351.8665	39771.95	N =	689
socs	9.84817	7.080689	6.994424	1.437877	0.01	25.39925	N =	689
liql	69.03954	41.6059	40.7416	10.00622	14.59086	243.8445	N =	689
Gsav	22.04782	7.256251	6.611872	3.114294	8.427173	56.93821	N =	689
lifex	73.88991	5.670988	5.591682	1.199397	51.51671	82.32195	N =	689
sches	89.4363	25.96915	24.8557	8.207717	23.8	161.6618	N =	689
schet	40.65365	20.96397	19.66468	7.715791	2	94.87337	N =	689
agdo	15.87309	7.335262	7.338302	0.945857	4.397616	30.97915	N =	689
agdy	39.21259	16.3596	16.20362	3.10783	19.55829	93.047	N =	689
agva	7.247208	6.382534	6.137898	1.928743	0.801097	33.32095	N =	689
tel	32.17355	20.5767	20.42	3.700953	0.802561	74.46233	N =	689
democ	8.164006	2.843921	2.665933	1.051024	0	10	N =	689
autoc	0.5500726	1.574009	1.487422	0.55106	0	7	N =	689
polity2	7.622642	4.2696	4.034057	1.496567	-7	10	N =	689
readir	0.3818547	11.85405	1.931211	11.69846	-258.574	144.7664	N =	689

Countries, N: 53, Algeria, Argentina, Australia, Austria, Belgium, Brazil, Bulgaria, Cameroon, Canada, Chile, China, Colombia, Costa Rica, Croatia, Cyprus, Czech Republic, Denmark, Dominican Republic, Ecuador, Finland, France, Germany , Greece, Guatemala, Hungary, India, Ireland, Israel, Italy, Japan, Jordan, Kenya, Korea, Malaysia, Mexico, Morocco, Netherlands, New Zealand, Peru, Philippines, Poland, Portugal, Romania, Slovenia, South Africa, Spain, Sweden, Switzerland, Thailand, Turkey, United Kingdom, United States, Uruguay, and Venezuela.

Table3-1 D: Correlation Matrix for Balanced Dataset2 of 53 Countries over 1994-2006

	lifpen	lifden	gdppc	socs	liql	Gsav	Infcp	lifex	sches	schet	agdo	agdy	agva	tel	democ	autoc	polity2	readir	laginfcp
lifpen	1																		
lifden	0.8152***	1																	
gdppc	0.6367***	0.8533***	1																
socs	0.2533***	0.3698***	0.6115***	1															
liql	0.4099***	0.5104***	0.4797***	0.124**	1														
Gsav	0.1179***	0.136***	0.0419	-0.2197***	0.3512***	1													
InfCP	-0.092**	-0.0776**	-0.0971**	-0.036	-0.0888**	-0.0486	1												
lifex	0.2192***	0.489***	0.6895***	0.6057***	0.3617***	0.0494	-0.0871**	1											
sches	0.4673***	0.4804***	0.6583***	0.6962***	0.2496***	-0.0229	-0.1146**	0.6328***	1										
schet	0.4018***	0.4863***	0.6841***	0.5988***	0.1506***	-0.0544	-0.0938**	0.704***	0.7309***	1									
agdo	0.3211***	0.4963***	0.6949***	0.8789***	0.2766***	-0.1779***	-0.054	0.6885***	0.704***	0.6712***	1								
agdy	-0.3512***	-0.4314***	-0.5926***	-0.765***	-0.3327***	-0.0438	0.0454***	-0.6951***	-0.7121***	-0.6729***	-0.8559***	1							
agva	-0.4653***	-0.4777***	-0.6445***	-0.5669***	-0.3188***	-0.0195	0.12***	-0.7196**	-0.6876***	-0.6403***	-0.5437***	0.6266***	1						
tel	0.5139***	0.6499***	0.8736***	0.7448***	0.4129***	-0.0645	-0.0905	0.7623***	0.7575***	0.7585***	0.8127***	-0.7673	-0.679	1					
democ	0.3473***	0.3665***	0.5225***	0.5493***	0.0675*	-0.3501***	-0.0197	0.4633***	0.5368***	0.5351***	0.5762***	-0.5306***	-0.4661	0.5914***	1				
autoc	-0.2223***	-0.2154***	-0.3199***	-0.3447***	0.1201**	0.3666***	-0.0192	-0.3138***	-0.3577***	-0.4029***	-0.359***	0.3144***	0.3708***	-0.3668***	-0.8667***	1			
polity2	0.3117***	0.3223***	0.4642***	0.4912***	-0.0011	-0.3698***	-0.0063	0.4232***	0.4892***	0.504***	0.5146***	-0.4679***	-0.4467***	0.5271***	0.9797***	-0.9467***	1		
readir	0.0338	0.0074	0.0009	-0.0078	0.0331	0.0254	-0.0015	-0.0311	0.0028	-0.0318	-0.0192	0.0052	0.0022	-0.0016	-0.0137	0.0286	-0.0196	1	
laginfcp	-0.0957**	-0.0799**	-0.0984**	-0.0242	-0.098**	-0.0579	0.6308***	-0.0929**	-0.126**	-0.1084**	-0.0677*	0.0528	0.0773**	-0.1012**	-0.0235	-0.0185	-0.0091	-0.0015	1

"***","**" and "*" indicate significance at 1%, 5% and 10% respectively

Table3-1 E: Summary Statistics of Dataset3 of 56 Developing Countries over 1960-2009

Variable	Mean	Overall Std. Dev	Between Std. Dev	Within Std. Dev	Min	Max	Observa tions, N
lifpen	0.011025	0.020973	0.017909	0.00911	0.000035	0.15013	1190
lifden	67.63159	219.7537	146.3938	141.3083	0.012218	2727.123	1145
gdppc	3439.47	5294.475	6377.662	2295.596	180.8607	59182.83	2471
socs	2.974729	3.356162	2.590968	1.511328	0	21.18562	1184
gsav	22.43855	12.11171	8.373954	9.632039	-233.923	74.35326	1639
infcp	38.4169	549.7956	106.4354	539.9948	-21.675	24411.03	2323
lifex	62.98985	8.959558	6.405953	6.388191	37.87134	82	2682
sches	52.50256	24.33872	17.61517	17.20974	0.5959	109.4957	1912
schet	14.90473	13.18206	9.19239	9.436215	0	98.09171	1625
agdo	7.291083	2.834454	2.638374	1.101182	1.248654	21.77242	2797
agdy	69.63492	19.21092	13.12924	14.13087	19.32563	108.0149	2797
agva	15.68691	11.58006	9.637642	6.604498	0.043773	74.23312	2509
liql	59.26982	475.1104	110.9605	460.8329	1.866373	15346.15	2493
tel	8.709724	9.938273	7.404992	6.640378	0.020773	58.92914	2041
democ	3.591135	3.795444	3.062019	2.276349	0	10	2617
autoc	3.756592	3.710467	3.094985	2.147169	0	10	2617
polity2	-0.15908	7.238156	6.031779	4.130138	-10	10	2615
readir	0.351483	8.823143	1.292623	8.734469	-258.574	144.7664	1433

Countries, N= 56: Algeria, Argentina, Bahrain, Bangladesh, Barbados, Botswana, Brazil, Cameroon, Chile, Colombia, Costa Rica, Côte d'Ivoire, Dominican Republic, Ecuador, Egypt, El Salvador, Guatemala, Honduras, India, Indonesia, Iran, Iraq, Jamaica, Jordan, Kenya, Korea, Rep., Kuwait, Lebanon, Libya, Malaysia, Mauritius, Mexico, Morocco, Namibia, Nigeria, Oman, Pakistan, Panama, Paraguay, Peru, Philippines, Qatar, Saudi Arabia, Singapore, South Africa, Sri Lanka, Syria, Thailand, Trinidad and Tobago, Tunisia, Turkey, United Arab Emirates, Uruguay, Venezuela, Vietnam and Zimbabwe.

Table3-1 F: Correlation Matrix for Dataset3 of 56 Developing Countries over 1960-2009

	lifpen	lifden	gdppc	socs	gsav	infcp	lifex	sches	schet	agdo	agdy	agva	liql	tel	democ	autoc	polity2	readir
lifpen	1																	
lifden	0.6974***	1																
gdppc	0.2246***	0.55***	1															
socs	-0.0763**	-0.0769**	0.0141	1														
gsav	0.1217***	0.3428***	0.4245***	-0.1643***	1													
infcp	-0.0553*	-0.0407	-0.0021	0.0565*	-0.0414	1												
lifex	-0.0074	0.2282***	0.397***	0.2695***	0.0937***	-0.0438**	1											
sches	0.3341***	0.3905***	0.3969***	0.2772***	0.139***	0.0002	0.7104***	1										
schet	0.3012***	0.5433***	0.2372***	0.1535***	0.029	0.0365	0.5846***	0.6462***	1									
agdo	0.0951**	0.2076***	-0.0515**	0.5651***	-0.1812***	0.018	0.288***	0.2072***	0.3763***	1								
agdy	-0.3013***	-0.3846***	-0.4918***	-0.3243***	-0.1581***	-0.008	-0.6772***	-0.7415***	-0.5616***	-0.302)***	1							
agva	-0.2633***	-0.3218***	-0.542***	-0.209***	-0.2958***	-0.0082	-0.6412***	-0.6164***	-0.3878***	-0.0694**	0.5095***	1						
liql	0.184***	0.274***	0.0234	-0.0147	0.1231***	-0.0066	0.0186	0.002	0.0041	-0.0233	0.0129	-0.0549**	1					
tel	0.389***	0.6115***	0.6083***	0.1837***	0.1692***	-0.028	0.6439***	0.7027***	0.6366***	0.2786***	-0.7516***	-0.5648***	0.0174	1				
democ	0.2645***	0.0972**	-0.0715***	0.1041***	-0.1163***	0.0064	0.2782***	0.236***	0.2668***	0.3969***	-0.2853***	-0.1188***	0.0303	0.1697***	1			
autoc	-0.2434***	-0.0952**	0.1729***	-0.0541*	0.152***	-0.0128	-0.2022***	-0.1526***	-0.2418***	-0.3927***	0.2185***	-0.0082	-0.0242	-0.0754**	-0.8533***	1		
polity2	0.2693***	0.1013**	-0.1252***	0.0835**	-0.1395***	0.0098	0.2502***	0.2036***	0.2627***	0.4101***	-0.2624***	-0.0593***	0.0282	0.1275***	0.9616***	-0.9617***	1	
readir	0.0332	0.0112	-0.0188	-0.0079	-0.0013	-0.0033	-0.008	-0.0035	-0.05	-0.0446	-0.0033	0.0055	0.0172	-0.0131	-0.0054	-0.0005	-0.0026	1

"***","**" and "*" indicate significance at 1%, 5% and 10% respectively

Table3-1 G: Summary Statistics of Dataset4 of 26 Advanced Economies over 1960-2009

Variable	Mean	Overall Std. Dev.	Between Std. Dev.	Within Std. Dev.	Min	Max	Observations
lifpen	0.030821	0.0371256	0.025763	0.029451	0.000741	0.357356	N = 1082
lifden	789.127	1660.276	1174.221	1319.446	5.570108	19114.17	N = 1065
gdppc	17563.75	8957.442	6525.087	6259.051	1107.98	56358.12	N = 1266
socs	12.94721	4.911629	3.559743	3.348732	3.335001	28.90926	N = 1064
gsav	22.30531	6.009683	4.367424	4.31546	-10.4321	62.63596	N = 921
infcp	6.957085	16.77201	6.893438	15.33123	-13.8454	373.8205	N = 1243
lifex	75.33964	3.327814	0.941555	3.199443	63.44195	82.58756	N = 1185
sches	90.63624	38.21856	11.79621	36.46744	16	1103	N = 1079
schet	35.27846	21.24815	12.37156	17.71578	0.7	97.9755	N = 1004
agdo	19.21758	4.184007	2.928007	3.042381	8.251525	33.91994	N = 1300
agdy	35.03385	9.436251	6.105227	7.292123	20.41454	66.09196	N = 1300
agva	4.963181	4.038494	2.940434	2.840107	0.299971	31.19487	N = 1050
liql	91.54187	110.1438	85.65484	76.62173	18.76997	1068.291	N = 1196
tel	41.04943	15.74704	8.541579	13.33213	1.070065	74.46233	N = 988
democ	9.409565	2.035818	1.143104	1.701057	0	10	N = 1150
autoc	0.269565	1.383867	0.709721	1.197023	0	9	N = 1150
polity2	9.143478	3.281847	1.803458	2.767086	-9	10	N = 1150
readir	0.557405	2.15836	0.79154	2.035088	-5.07629	49.41914	N = 820

Countries are: Australia, Austria, Belgium, Canada, Cyprus, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Israel, Italy, Japan, Luxembourg, Malta, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom, and United States.

Table3-1 H: Correlation Matrix for Dataset4 of 26 Advanced Economies over 1960-2009

	lifpen	lifden	gdppc	socs	gsav	infcp	lifex	sches	schet	agdo	agdy	agva	liql	tel	democ	autoc	polity2	readir
lifpen	1																	
lifden	0.9514***	1																
gdppc	0.6138***	0.63***	1															
socs	0.1748***	0.1481***	0.199***	1														
gsav	0.1752***	0.19***	0.1897***	-0.117***	1													
infcp	-0.1323***	-0.0977**	-0.1231***	-0.115**	-0.1147**	1												
lifex	0.3974***	0.3327***	0.641***	0.3904***	-0.0319	-0.1254***	1											
sches	0.159***	0.0945**	0.2815***	0.1694***	-0.0206	-0.0899**	0.4038***	1										
schet	0.2261***	0.1259**	0.5063***	0.2884***	-0.1991)***	-0.141***	0.6986***	0.419***	1									
agdo	0.2004***	0.1612***	0.4455***	0.6323***	-0.0291	-0.1514***	0.5702***	0.212***	0.3742***	1								
agdy	-0.2844***	-0.2433***	-0.5357***	-0.4913***	-0.0743**	0.2679***	-0.6751***	-0.3123***	-0.4501)***	-0.7169***	1							
agva	-0.4045***	-0.345***	-0.5472***	-0.3327***	-0.0363	0.1918***	-0.5712***	-0.2128***	-0.4347)***	-0.4081**	0.5626***	1						
liql	0.1598***	0.2192***	0.1374***	0.0999**	0.1541***	-0.0487*	-0.0159	-0.0479	-0.0981**	0.1556***	-0.1291***	-0.1303***	1					
tel	0.324***	0.2735***	0.677***	0.2777***	-0.0843)**	-0.2311***	0.7385***	0.3481***	0.6413***	0.4443***	-0.5932***	-0.5532***	0.0035	1				
democ	0.1807***	0.1448***	0.3343***	-0.1231**	0.0771**	-0.0508*	0.3173***	0.1993***	0.266***	0.243***	-0.2914***	-0.4714***	0.0715**	0.3255***	1			
autoc	-0.1402***	-0.1066***	-0.2981***	0.0473	.	-0.0125	-0.278***	-0.1807***	-0.2129***	-0.2144***	0.1868***	0.3897***	-0.0572*	-0.2262***	-0.839***	1		
polity2	0.1699***	0.1339***	0.327***	-0.115***	0.0783**	-0.0253	0.3157***	0.1976***	0.2535***	0.2408***	-0.2588***	-0.4642***	0.0677**	0.3078***	0.9692***	-0.9423***	1	
readir	0.011	0.0107	-0.026	0.158***	-0.002	-0.0929**	0.1204**	-0.0014	0.0053	-0.0147	-0.0941**	-0.1202***	-0.0037	0.0009	-0.002	0.09**	-0.0378	1

"***","**" and "*" indicate significance at 1%, 5% and 10% respectively

Table3-1 I: Summary Statistics of Dataset5 of 14 Transitional Economies over 1986-2009

Variable	Mean	Overall Std. Dev.	Between Std. Dev.	Within Std. Dev.	Min	Max	Observations
lifpen	0.006697	0.0054863	0.003713	0.004204	0.000059	0.02695	N = 219
lifden	38.92473	48.44817	33.25377	35.03811	0.036251	267.7353	N = 216
gdppc	3944.879	2437.747	2344.345	1013.639	589.8821	13784.23	N = 308
socs	13.13902	3.895741	3.551469	2.024776	3.087714	24.1002	N = 208
gsav	21.80553	8.50249	5.322314	6.884436	-16.4237	71.35675	N = 253
infcp	80.33389	353.9712	100.2433	341.2782	-1.13202	4734.915	N = 266
lifex	71.03492	2.913094	2.580699	1.535588	64.10976	78.9739	N = 329
sches	91.76578	7.331434	3.846227	6.381161	70	110	N = 260
schet	40.58856	18.89899	10.77136	16.01135	8.50114	86.71274	N = 260
agdo	18.98663	3.69444	3.080394	2.193521	8.970671	25.47105	N = 336
agdy	28.99444	6.757492	4.650195	5.052133	19.35592	51.28407	N = 336
agva	9.297866	5.974036	3.838368	4.681223	2.282839	33.10452	N = 311
liql	42.36042	17.59004	13.72642	11.98796	8.57049	136.0224	N = 262
tel	23.92037	9.454567	6.376102	7.274072	6.041197	51.19	N = 332
democ	6.94898	3.411602	2.516296	2.471467	0	10	N = 294
autoc	1.02381	2.174027	1.371582	1.771079	0	8	N = 294
polity2	5.935374	5.403125	3.800594	4.092185	-8	10	N = 294
readir	-0.09761	1.389091	0.316993	1.355675	-18.1695	5.354465	N = 224

Countries, N: 14, Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Kazakhstan, Latvia, Lithuania, Poland, Romania, Russia, Slovakia, Slovenia, and Ukraine.

Table3-1J: Correlation Matrix for Dataset5 of 14 Transitional Economies over 1986-2009

	lifpen	lifden	gdppc	socs	gsav	infcp	lifex	sches	schet	agdo	agdy	agva	liql	tel	democ	autoc	polity2	readir
lifpen	1																	
lifden	0.879***	1																
gdppc	0.6625***	0.8429***	1															
socs	0.3949***	0.3749***	0.4186***	1														
gsav	0.107	0.1066	0.0817	-0.0625	1													
infcp	-0.1315*	-0.1208*	-0.1708**	-0.2042**	-0.0094	1												
lifex	0.6323***	0.7219***	0.7801***	0.5358***	-0.0584	-0.1618**	1											
sches	0.3638***	0.3338***	0.2456***	0.2233***	-0.0885	-0.0822	0.1723***	1										
schet	0.2541***	0.3673***	0.3036***	-0.0153	-0.1075	-0.0901	0.1709***	0.4857***	1									
agdo	0.0448	0.0817	0.2366***	0.3514***	-0.2819***	-0.112*	0.3977***	0.105*	0.4339***	1								
agdy	-0.3731***	-0.4102***	-0.4255***	-0.3589***	0.0877	0.2055***	-0.5101***	-0.1369**	-0.601***	-0.8225***	1							
agva	-0.5645***	-0.5303***	-0.5772***	-0.2806***	-0.1462**	0.3491***	-0.4146***	-0.239***	-0.42***	-0.2952***	0.4955***	1						
liql	0.4607***	0.4355***	0.4167***	0.4434***	0.1375**	-0.1398**	0.5914***	0.1605**	-0.0326	0.2658***	-0.4007***	-0.2351***	1					
tel	0.3986***	0.4847***	0.5306***	0.2923***	-0.0388	-0.2029**	0.5277***	0.298***	0.5213***	0.7093***	-0.7279***	-0.5203***	0.2836***	1				
democ	0.4499***	0.4129***	0.4771***	0.5175***	-0.1687**	-0.1586**	0.5342***	0.3903***	0.3046***	0.5842***	-0.6115***	-0.4378***	0.3514***	0.572***	1			
autoc	-0.2158**	-0.1676**	-0.2662***	-0.4318***	0.0937	0.0377	-0.3266***	-0.3355***	-0.2786***	-0.5705**	0.5643***	0.2641***	-0.2553***	-0.4603***	-0.8682***	1		
polity2	0.3889***	0.3486***	0.415***	0.5131***	-0.1459**	-0.1184*	0.4683***	0.3709***	0.3034***	0.6006***	-0.6139***	-0.3841***	0.3274***	0.5447***	0.9769***	-0.9514***	1	
readir	0.0946	0.0903	0.0803	0.1221*	0.0795	-0.0782	0.1046	-0.0118	-0.0425	-0.0122	-0.0442	-0.0809	0.0477	0.1066	0.0492	-0.0306	0.0456	1

"***","**" and "*" indicate significance at 1%, 5% and 10% respectively

Table3- 2: Test Results of CSD Using Balanced Dataset2 of 53 Countries over 1994-2006

Variable	Moran's I, z	p-value	Variable	ρ	CD, Pesaran	probability	CD_{LM}, Frees
agdo	3.318***	0	Δagdo	0.603	-2.125	1.9664	19.059***
agdy	2.381**	0.009	Δagdy	0.646	1.96**	0.05	19.76***
agva	1.258	0.104	Δagva	0.243	3.802***	0.0001	0.19
loggdppc	1.885**	0.03	Δloggdppc	0.333	16.746***	0	3.927***
gsavgdsav	2.226**	0.013	Δgsav	0.262	5.144***	0	0.443***
laginfcp	0.456	0.324	Δlaginfcp	0.28	11.003***	0	0.997***
tel	2.398**	0.008	Δtel	0.425	36.436***	0	8.918***
schet	2.145**	0.016	Δschet	0.29	4.535***	0	2.107***
sches	2.034**	0.021	Δsches	0.269	3.29***	0	1.22***
liql	1.412*	0.079	Δliql	0.26	4.387***	0	0.542***
lifex	4.704***	0	Δlifex	0.349	7.02***	0	5.312***
loglifpen	2.407**	0.008	Δloglifpen	0.246	5.442***	0	0.159
loglifden	1.864**	0.031	Δloglifden	0.25	4.395***	0	0.346**
socs	3.798***	0	Δsocs	0.243	5.895***	0	0.379**
readir	-0.102	0.459	Δreadir	0.277	2.614***	0.0089	0.9***
democ	1.453**	0.073	Δagdo_98	0.341	59.126***	0.00	13.597***
autoc	1.145	0.126	Δagdy_98	0.398	72.966***	0.00	16.934***
polity2	1.412*	0.079	Δtel_98	0.308	38.324***	0.00	10.031***
			Δlifex_98	0.374	46.507***	0.00	13.355***
			Δagva_98	0.207	10.281***	0.00	0.723***
Critical values from Frees' Q distribution							
alpha	=	0.05	:	0.2838			
alpha	=	0.05	:	0.2838			
alpha	=	0.01	:	0.4252			

Notes: The CDs tests do not provide results of polity2, democ and autoc; 98 indicate that the variable is for the whole dataset of 98 countries over the period 1960-2009. "***","**"and "*" indicate significance at 1%, 5% and 10% respectively.; Cross Sec. Dep.=cross section dependence

CSD=Cross Section Dependence

Table3-3 :Summary of M-W-PP Test Results for 98 Countries over 1960-2009																		
Series:	Agdo	Agdy	Autoc	Agva	Democ	Log GDPpc	GSav	Infcp	Log lifden	Log lifpen	Polity2	Readir	Sches	Schet	Socs	Tel	liql	lifex
Exogenous variables: Individual effects																		
Observations:	4798	4798	2587	3941	2773	4109	2759	3814	2266	2330	3043	2434	3011	2567	2383	3262	3714	4258
Countries included:	98	98	56	98	61	98	94	96	88	91	67	92	98	98	90	98	92	98
Statistic	583.012	83.9294	152.851	305.789	148.697	71.7455	398.326	1925.11	153.468	161.890	108.982	794.281	239.926	53.5917	240.591	136.17	155.825	427.777
Probability	0	1	0.0063	0	0.0505	1	0	0	0.8889	0.8555	0.9445	0	0.0177	1	0.0017	0.9996	0.9352	0
Exogenous variables: Individual effects, individual linear trends																		
Observations:	4798	4798	2587	3941	2773	4109	2759	3814	2263	2324	3043	2434	3011	2567	2383	3262	3714	4258
countries included:	98	98	56	98	61	98	94	96	87	89	67	92	98	98	90	98	92	98
Statistic	1117.41	272.892	154.212	364.787	160.129	146.104	371.317	588.96 1	156.017	151.728	113.359	1039.73	269.529	63.1551	300.207	44.5629	172.399	187.000
Probability	0.0000	0.0002	0.0051	0	0.0117	0.9969	0	0	0.8323	0.9239	0.9016	0	0.0004	1	0	1	0.7201	0.6656

M-W-PP =Maddala-WU-Phillips-Perron Fisher Type Test; Newey-West automatic bandwidth selection and Bartlett kernel; for agdo Andrews automatic bandwidth selection and Parzen kernel.

Table3- 3: *(continued)*																	
Series:	Δ agdy	Δ autoc	Δ agva	Δ democ	Δlog GDP pc	Δ GSav	Δ Infcp	ΔLog lifden	Δlog lifpen	Δ polity2	Δ readir	Δ Sches	Δ Schet	Δ Socs	ΔTel	Δliql	Δlifex
Exogenous variables: Individual effects																	
Number of observations:	4699	2530	3841	2663	4010	2658	3718	2160	2216	2974	2331	2740	2292	2266	3162	3613	4149
Cross-sections included:	98	56	98	60	98	94	96	86	88	67	92	98	98	90	98	92	98
Statistic	352.925	1657.15	2796.2	1699.37	1361.29	1877.82	3276.65	1252.49	1307.06	1686.87	2152.13	1757.6	1029.1	1675.35	596.344	2067.30	1268.64
Probability	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0000
Exogenous variables: Individual effects, individual linear trends																	
Number of observations:	4699	2530	3841	2711	4010	2658	3718	2151	2210	2974	2325	2740	2292	2260	3162	3613	4149
Cross-sections included:	98	56	98	61	98	94	96	83	86	67	90	98	98	88	98	92	98
Statistic	**341.052**	**2282.71**	**5392.65**	**3378**	**1449.49**	**4193.95**	**7562.5**	1991.87	2169.93	**1788.01**	**7823.25**	**3256.62**	**1133.45**	**2396.51**	**686.95**	2443.92	1881.46
Probability	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table3- 4: Summary of CIPS Test Results of 98 Countries over 1960-2009																		
Series:	Agdo	Agdy	Autoc	Agva	Democ	Log GDPpc	GSav	Infcp	Log lifden	Log lifpen	Polity2	Readir	Sches	Schet	Socs	Tel	liql	lifex
With a constant																		
Number of observations:	4697	4697	2792	3839	2790	4010	2658	3718	2225	2283	3053	2331	2740	2292	2253	3160	3801	4040
Cross-sections included:	98	98	63	98	64	98	94	96	89	92	70	92	98	98	89	98	98	98
Z[t-bar] Statistic	-20.961	-37.705	-1.200	-5.483	-4.794	1.122	-2.923	-10.294	6.221	6.464	-4.128	-7.496	-0.064	6.762	2.605	1.204	3.154	11.247
Probability	0.000	0.000	0.115	0.000	0.000	0.869	0.002	0.000	1.000	1.000	0.000	0.000	0.474	1.000	0.995	0.886	0.999	1.000
with a constant and trend																		
Number of observations:	4697	4697	2792	3839	2790	4010	2658	3718	2225	2283	3053	2331	2740	2292	2253	3160	3801	4040
Cross-sections included:	98	98	63	98	64	98	94	96	89	92	70	92	98	98	89	98	98	98
Z[t-bar]Statistic	-15.837	-30.226	0.314	-2.746	-2.781	0.926	-3.380	-7.419	4.356	6.389	-2.406	-4.249	4.925	9.345	2.897	8.809	5.183	11.693
Probability	0.000	0.000	0.623	0.003	0.003	0.823	0.000	0.000	1.000	1.000	0.008	0.000	1.000	1.000	0.998	1.000	1.000	1.000

Table3-4: (*continued*)																		
Series:	Δagdo	Δ agdy	Δ autoc	Δ agva	Δ democ	Δlog GDP pc	Δ GSav	Δ Infcp	ΔLog lifden	Δlog lifpen	Δ polity2	Δ readir	Δ Sches	Δ Schet	Δ Socs	ΔTel	Δliql	Δlifex
With a constant																		
Number of observations:	4598	4598	2727	3739	2724	3911	2560	3622	2130	2182	2980	2228	2502	2058	2150	3060	3694	4040
Cross-sections included:	98		63	98	64	98	94	96	89	92	70	92	98		89	98	98	98
Z[t-bar] Statistic	-24.118	-30.565	-18.407	-32.307	-23.766	-18.275	-22.283	-32.404	-6.661	-8.204	-22.724	-23.002	-14.423	-7.467	-11.804	-7.816	-22.416	-12.685
Probability	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
with a constant and trend																		
Number of observations:	4598	4598	2727	3739	2724	3911	2560	3622	2130	2182	2980	2228	2502	2058	2150	3060	3694	4040
Cross-sections included:	98	98	63	98	64	98	94	96	89	92	70	92	98	98	89	98	98	98
Z[t-bar] Statistic	**-31.503**	**-34.304**	**-16.220**	-29.680	-21.881	-15.747	-17.648	-29.085	-4.658	-5.949	**-20.626**	**-18.408**	-9.766	-3.344	-7.346	-8.787	-19.068	-8.484
Probability	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Δ denotes first difference

Table 3- 5: Summary of CIPS Test Results for 55 countries over 1960-2009

Series:	Agdo	Agdy	Autoc	Agva	Democ	Log GDPpc	GSav	Infcp	Log lifden	Log lifpen	Readir	Sches	Schet	Socs	Tel	liql	lifex
With a constant																	
Number of observations:	1920	1296	1385	1199	1521	1874	1151	889	1511	1529	447	1152	1320	1189	1304	1775	1445
Z[t-bar] Statistic	-14.735	-21.545	-0.487	-2.245	-1.350	0.155	1.950	-4.124	5.587	5.691	0.777	1.711	4.028	2.992	3.924	1.477	1.137
Probability	0.000	0.000	0.313	0.012	0.089	0.562	0.974	0.000	1.000	1.000	0.781	0.956	1.000	0.999	1.000	0.930	0.872
with a constant and trend																	
Number of observations:	1920	1296	1385	1199	1521	1874	1151	889	1511	1529	447	1152	1320	1189	1304	1775	1445
Z[t-bar]Statistic	-11.103	-19.758	1.292	1.846	0.509	-0.193	2.052	-2.768	4.511	5.507	2.541	5.025	8.261	1.099	7.098	3.180	5.810
Probability	0.000	0.000	0.902	0.968	0.695	0.424	0.980	0.003	1.000	1.000	0.994	1.000	1.000	0.864	1.000	0.999	1.000

Table 3-5: *(continued)*

Series:	Δagdo	Δ agdy	Δ autoc	Δ agva	Δ democ	Δlog GDP pc	Δ GSav	Δ Infcp	ΔLog lifden	Δlog lifpen	Δ readir	Δ Sches	Δ Schet	Δ Socs	ΔTel	Δliql	Δlifex
With a constant																	
Number of observations:	1880	1269	1354	1170	1487	1832	1113	868	1450	1468	426	1052	1196	1140	1264	1726	1408
Z[t-bar] Statistic	-14.897	-18.406	-13.820	-15.992	-17.371	-14.579	-12.472	-16.900	-6.059	-7.466	-4.702	-11.154	-4.077	-9.332	-6.939	-14.252	-6.527
Probability	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
With a constant a linear trend																	
Number of observations:	1880	1269	1354	1170	1487	1832	1113	868	1450	1468	426	1052	1196	1140	1264	1726	1408
Z[t-bar] Statistic	-20.096	-18.689	-11.958	-14.356	-15.994	-12.783	-10.044	-15.198	-4.096	-5.396	-3.671	-8.596	-1.294	-6.656	-7.106	-11.465	-2.946
Probability	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.098	0.000	0.000	0.000	0.002

Table 3-6A Summary of Cointegration Test Results

Cointegration test	LOGLIFDEN SOCS GSAV INFCP SCHET AGVA LIQL AGDO AGDY TEL DEMOC READIR LIFEX LOGGDPPC					
	Demeaned data		De-trended data		De-trended and cross-sectionally de-meaned data	
Method	Statistic	Prob.	Statistic	Prob.	Statistic	Prob.
Kao - ADF	-2.881001	0.0020	-1.425375	0.0770	-1.425375	0.0770
$CADFC_P$ Cointegration test results based on original data and CCE approach						
$CADFC_P$	-5.41	0.000				

Cointegration test	LOGLIFPEN SOCS GSAV INFCP SCHET AGVA LIQL AGDO AGDY TEL DEMOC READIR LIFEX LOGGDPPC					
	Demeaned data		De-trended data		De-trended and cross-sectionally de-meaned data	
Method	Statistic	Prob.	Statistic	Prob.	Statistic	Prob.
Kao - ADF	-2.390497	0.0084	-1.483599	0.0690	-2.390497	0.0084
$CADFC_P$ Cointegration test results based on original data and CCE approach						
$CADFC_P$	-5.78	0.000				

Cointegration test	LOGLIFPEN LOGGDPPC SOCS GSAV SCHES LIQL TEL							
	Demeaned data				De-trended data		De-trended and cross-sectionally de-meaned data	
	Without trend		With trend		Without trend		Without trend	
Method	Statistic	Prob.	Statistic	Prob.	Statistic	Prob.	Statistic	Prob.
Pedroni Group ADF-Statistic	-0.805581	0.2102	-3.874355	0.0001	-4.187561	0.0000	-4.187563	0.0000
Kao - ADF	-3.117284	0.0009			-1.666088	0.0478	-1.666088	0.0478
$CADFC_P$ Cointegration test results based on original data and CCE approach								
$CADFC_P$	-4.70	0.000						

Cointegration test	LOGLIFDEN LOGGDPPC SOCS GSAV SCHES LIQL TEL							
	Demeaned data				De-trended data		De-trended and cross-sectionally de-meaned data	
	Without trend		With trend					
Method	Statistic	Prob.	Statistic	Prob.	Statistic	Prob.	Statistic	Prob.
Pedroni Group ADF-Statistic	-0.805530	0.2103	-3.874311	0.0001	-3.456140	0.0003	-3.456141	0.0003
Kao - ADF	-3.731300	0.0001			-1.581776	0.0569	-1.581776	0.0569
$CADFC_P$ Cointegration test results based on original data and CCE approach								
$CADFC_P$	-4.70	0.000						

Note: Kao Test: Automatic lag length selection based on Schwarz Information Criteria (SIC); Newey-West automatic bandwidth selection and Bartlett kernel. H_0= no cointegration. The critical value at 5% for $CADFC_P$ is -2.28. It is from Banerjee and Carrion-i-Silvestre (2011, Table 3, p.29). Note that the Pedroni test in EViews 7.1, allows inclusion of at most seven variables, therefore we try to alternate between some of the variables, and the results were almost the same.

Table3- 6B: CCEP Results of ECM

	(1)	(2)
VARIABLES	∆loglifpen	∆loglifden
ECT_{t-1}	-0.339***	
	(0.0828)	
∆loggdppc$_{t-1}$	0.681*	0.974**
	(0.365)	(0.373)
∆loglifpen$_{t-4}$	-0.0800**	
	(0.0372)	
ECT_{t-1}		-0.322***
		(0.0862)
∆loglifden$_{t-4}$		-0.0796**
		(0.0318)
Constant	0.0342***	0.0510***
	(0.00897)	(0.00937)
Observations	883	882
R-squared	0.157	0.153
Number of countries	52	52
Adj. R-squared	0.153	0.151
standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1		

ECT= Error Correction Term, Note that the data set used for the error correction test is the same data set used for cointegration test.

Table3- 7A: Panel Estimation Results of Dataset1 of 98 Countries over the Period 1960-2009

	FE	FE	FE	FE	FE	FE	FE	FE	FE	FE	FE	FE
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Variable	loglifden	loglifden	loglifden	loglifden	loglifden	loglifden	loglifpen	loglifpen	loglifpen	loglifpen	loglifpen	loglifpen
loggdppc	1.720***	1.710***	1.716***	1.782***	1.785***	1.788***	0.720***	0.710***	0.716***	0.782***	0.785***	0.788***
	(0.126)	(0.127)	(0.126)	(0.112)	(0.114)	(0.113)	(0.126)	(0.127)	(0.126)	(0.112)	(0.114)	(0.113)
agdv	-0.00651*	-0.00693**	-0.00671**	-0.00703**	-0.00730**	-0.00696**	-0.00651*	-0.00693**	-0.00671**	-0.00703**	-0.00730**	-0.00696**
	(0.00335)	(0.00339)	(0.00337)	(0.00323)	(0.00330)	(0.00327)	(0.00335)	(0.00339)	(0.00337)	(0.00323)	(0.00330)	(0.00327)
agdo	0.0358***	0.0357***	0.0358***	0.0316***	0.0319***	0.0318***	0.0358***	0.0357***	0.0358***	0.0316***	0.0319***	0.0318***
	(0.00921)	(0.00920)	(0.00920)	(0.00895)	(0.00895)	(0.00895)	(0.00921)	(0.00920)	(0.00920)	(0.00895)	(0.00895)	(0.00895)
agva	-0.0169**	-0.0173***	-0.0172**	-0.00551	-0.00606	-0.00558	-0.0169**	-0.0173***	-0.0172**	-0.00551	-0.00606	-0.00558
	(0.00678)	(0.00671)	(0.00676)	(0.00629)	(0.00628)	(0.00629)	(0.00678)	(0.00671)	(0.00676)	(0.00629)	(0.00628)	(0.00629)
gsav	-0.00330	-0.00333	-0.00332	-0.00499*	-0.00509*	-0.00502*	-0.00330	-0.00333	-0.00332	-0.00499*	-0.00509*	-0.00502*
	(0.00282)	(0.00282)	(0.00282)	(0.00271)	(0.00271)	(0.00271)	(0.00282)	(0.00282)	(0.00282)	(0.00271)	(0.00271)	(0.00271)
laginfcp	-0.000337***	-0.000336***	-0.000337***	-0.000279***	-0.000280***	-0.000280***	-0.000337***	-0.000336***	-0.000337***	-0.000279***	-0.000280***	-0.000280***
	(7.98e-05)	(7.98e-05)	(7.98e-05)	(6.81e-05)	(6.81e-05)	(6.81e-05)	(7.98e-05)	(7.98e-05)	(7.98e-05)	(6.81e-05)	(6.81e-05)	(6.81e-05)
tel	0.0193***	0.0193***	0.0193***	0.0185***	0.0186***	0.0185***	0.0193***	0.0193***	0.0193***	0.0185***	0.0186***	0.0185***
	(0.00253)	(0.00253)	(0.00253)	(0.00246)	(0.00246)	(0.00246)	(0.00253)	(0.00253)	(0.00253)	(0.00246)	(0.00246)	(0.00246)
liql	-0.000111	-0.000107	-0.000109	-8.54e-05	-8.28e-05	-8.60e-05	-0.000111	-0.000107	-0.000109	-8.54e-05	-8.28e-05	-8.60e-05
	(0.000195)	(0.000195)	(0.000195)	(0.000197)	(0.000197)	(0.000197)	(0.000195)	(0.000195)	(0.000195)	(0.000197)	(0.000197)	(0.000197)
lifex	0.00959	0.0100	0.00971	0.00300	0.00220	0.00244	0.00959	0.0100	0.00971	0.00300	0.00220	0.00244
	(0.00832)	(0.00836)	(0.00832)	(0.00787)	(0.00786)	(0.00785)	(0.00832)	(0.00836)	(0.00832)	(0.00787)	(0.00786)	(0.00785)
socs	0.0262***	0.0263***	0.0262***	0.0299***	0.0300***	0.0299***	0.0262***	0.0263***	0.0262***	0.0299***	0.0300***	0.0299***
	(0.00659)	(0.00659)	(0.00659)	(0.00659)	(0.00659)	(0.00659)	(0.00659)	(0.00659)	(0.00659)	(0.00659)	(0.00659)	(0.00659)
readir	-0.000415	-0.000411	-0.000415	-0.000506	-0.000514	-0.000508	-0.000415	-0.000411	-0.000415	-0.000506	-0.000514	-0.000508
	(0.00115)	(0.00115)	(0.00115)	(0.00115)	(0.00115)	(0.00115)	(0.00115)	(0.00115)	(0.00115)	(0.00115)	(0.00115)	(0.00115)
sches				0.000552	0.000553	0.000554				0.000552	0.000553	0.000554
				(0.000342)	(0.000342)	(0.000342)				(0.000342)	(0.000342)	(0.000342)
schet	-0.00101	-0.00103	-0.00102				-0.00101	-0.00103	-0.00102			
	(0.00156)	(0.00156)	(0.00156)				(0.00156)	(0.00156)	(0.00156)			
democ	-0.000377			0.00760			-0.000377			0.00760		
	(0.00793)			(0.00751)			(0.00793)			(0.00751)		
Autoc		0.00582			-0.00593			0.00582			-0.00593	
		(0.0117)			(0.0111)			(0.0117)			(0.0111)	
polity2			-0.00143			0.00457			-0.00143			0.00457
			(0.00509)			(0.00484)			(0.00509)			(0.00484)
Constant	-12.30***	-12.23***	-12.25***	-12.47***	-12.36***	-12.45***	-12.30***	-12.23***	-12.25***	-12.47***	-12.36***	-12.45***
	(1.227)	(1.216)	(1.221)	(1.049)	(1.048)	(1.049)	(1.227)	(1.216)	(1.221)	(1.049)	(1.048)	(1.049)
Observations	1,092	1,092	1,092	1,176	1,176	1,176	1,092	1,092	1,092	1,176	1,176	1,176
R-squared	0.734	0.734	0.734	0.709	0.709	0.709	0.557	0.557	0.557	0.524	0.523	0.524
Number of id (countries)	74	74	74	75	75	75	74	74	74	75	75	75
Adj. R-squared	0.711	0.711	0.711	0.686	0.686	0.686	0.519	0.520	0.519	0.486	0.485	0.486

Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Table 3-7B: Panel Estimation Results of Dataset1 of 98 Countries over the Period 1960-2009

	CCEP	CCEP	CCEP	CCEP	CCEP	CCEP	CCEP	CCEP	CCEP	CCEP	CCEP	CCEP
	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)
Variables	loglifden	loglifden	loglifden	loglifden	loglifden	loglifden	loglifpen	loglifpen	loglifpen	loglifpen	loglifpen	loglifpen
loggdppc	1.815***	1.810***	1.816***	1.778***	1.763***	1.772***	0.812***	0.807***	0.814***	0.772***	0.757***	0.765***
	(0.117)	(0.119)	(0.118)	(0.129)	(0.130)	(0.129)	(0.117)	(0.119)	(0.118)	(0.128)	(0.129)	(0.129)
agdy	-0.00624	-0.00679*	-0.00631	-0.00325	-0.00375	-0.00350	-0.00621	-0.00677*	-0.00629	-0.00330	-0.00380	-0.00354
	(0.00385)	(0.00390)	(0.00388)	(0.00418)	(0.00419)	(0.00419)	(0.00386)	(0.00390)	(0.00389)	(0.00419)	(0.00420)	(0.00420)
agdo	0.0284***	0.0284***	0.0284***	0.0317***	0.0314***	0.0316***	0.0288***	0.0288***	0.0287***	0.0320***	0.0316***	0.0319***
	(0.00971)	(0.00971)	(0.00971)	(0.00969)	(0.00968)	(0.00968)	(0.00973)	(0.00973)	(0.00973)	(0.00970)	(0.00969)	(0.00969)
agva	-0.00229	-0.00286	-0.00242	-0.0114*	-0.0117*	-0.0117*	-0.00241	-0.00298	-0.00253	-0.0116*	-0.0119*	-0.0119*
	(0.00637)	(0.00636)	(0.00637)	(0.00688)	(0.00681)	(0.00686)	(0.00637)	(0.00635)	(0.00637)	(0.00687)	(0.00681)	(0.00685)
gsav	-0.00742***	-0.00752***	-0.00744***	-0.00635**	-0.00644**	-0.00640**	-0.00733***	-0.00742***	-0.00735***	-0.00623**	-0.00631**	-0.00628**
	(0.00274)	(0.00274)	(0.00274)	(0.00287)	(0.00287)	(0.00287)	(0.00274)	(0.00274)	(0.00274)	(0.00287)	(0.00287)	(0.00287)
laginfcp	-0.000286***	-0.000286***	-0.000287***	-0.000328***	-0.000326***	-0.000327***	-0.000287***	-0.000287***	-0.000288***	-0.000328***	-0.000327***	-0.000328***
	(6.91e-05)	(6.91e-05)	(6.91e-05)	(8.11e-05)	(8.11e-05)	(8.11e-05)	(6.91e-05)	(6.91e-05)	(6.91e-05)	(8.11e-05)	(8.11e-05)	(8.11e-05)
tel	0.0168***	0.0168***	0.0168***	0.0186***	0.0185***	0.0185***	0.0168***	0.0169***	0.0168***	0.0186***	0.0185***	0.0186***
	(0.00294)	(0.00293)	(0.00293)	(0.00300)	(0.00300)	(0.00300)	(0.00294)	(0.00294)	(0.00294)	(0.00301)	(0.00300)	(0.00300)
liql	-0.000117	-0.000118	-0.000120	-0.000135	-0.000129	-0.000131	-0.000122	-0.000122	-0.000124	-0.000140	-0.000133	-0.000136
	(0.000206)	(0.000207)	(0.000207)	(0.000203)	(0.000203)	(0.000203)	(0.000206)	(0.000206)	(0.000206)	(0.000203)	(0.000203)	(0.000203)
lifex	1.51e-05	-0.000304	-0.000320	0.00503	0.00615	0.00553	8.10e-05	-0.000248	-0.000268	0.00506	0.00617	0.00556
	(0.00817)	(0.00816)	(0.00815)	(0.00862)	(0.00867)	(0.00863)	(0.00817)	(0.00817)	(0.00816)	(0.00863)	(0.00868)	(0.00864)
socs	0.0368***	0.0370***	0.0368***	0.0340***	0.0342***	0.0341***	0.0364***	0.0366***	0.0364***	0.0334***	0.0335***	0.0334***
	(0.00694)	(0.00694)	(0.00695)	(0.00697)	(0.00697)	(0.00697)	(0.00689)	(0.00689)	(0.00689)	(0.00691)	(0.00690)	(0.00691)
readir	-0.000485	-0.000498	-0.000495	-0.000411	-0.000399	-0.000406	-0.000484	-0.000497	-0.000495	-0.000409	-0.000399	-0.000406
	(0.00115)	(0.00115)	(0.00115)	(0.00114)	(0.00114)	(0.00114)	(0.00115)	(0.00115)	(0.00115)	(0.00114)	(0.00114)	(0.00114)
sches	0.000539	0.000541	0.000542				0.000537	0.000540	0.000540			
	(0.000344)	(0.000344)	(0.000344)				(0.000344)	(0.000344)	(0.000344)			
schet				-0.00339*	-0.00339*	-0.00339*				-0.00333*	-0.00333*	-0.00333*
				(0.00183)	(0.00183)	(0.00183)				(0.00183)	(0.00183)	(0.00183)
democ	0.00470			-0.00452			0.00473			-0.00451		
	(0.00761)			(0.00806)			(0.00762)			(0.00807)		
autoc		-7.21e-05			0.0121			-0.000159			0.0120	
		(0.0111)			(0.0117)			(0.0111)			(0.0117)	
polity2			0.00231			-0.00402			0.00234			-0.00399
			(0.00487)			(0.00512)			(0.00487)			(0.00512)
Constant	-12.27**	-11.76**	-11.83**	-10.58**	-10.58**	-10.46**	-12.30**	-11.73**	-11.86**	-10.91**	-10.85**	-10.72**
	(5.174)	(5.355)	(5.272)	(4.886)	(5.089)	(5.007)	(5.293)	(5.483)	(5.380)	(5.102)	(5.318)	(5.211)
Observations	1,176	1,176	1,176	1,092	1,092	1,092	1,176	1,176	1,176	1,092	1,092	1,092
R-squared	0.718	0.718	0.718	0.743	0.744	0.743	0.537	0.537	0.537	0.572	0.573	0.572
Number of id (countries)	75	75	75	74	74	74	75	75	75	74	74	74
Adj. R-squared	0.691	0.691	0.691	0.717	0.718	0.717	0.494	0.494	0.494	0.529	0.530	0.529

Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Table 3-7C: OLS Regression Results ††

Variables	loglifden	loglifpen
Log GDP per capita	0.866***	-0.138
	(0.322)	(0.317)
Agriculture value added	-0.0856**	-0.0854**
	(0.0348)	(0.0342)
Life expectancy	-0.140***	-0.136***
	(0.0368)	(0.0362)
Liquid liability	0.00481*	0.00464*
	(0.00246)	(0.00242)
Telephone mainlines	0.00563	0.00517
	(0.0195)	(0.0192)
Real deposit interest rates	0.0201	0.0261
	(0.0869)	(0.0854)
Inflation	-0.00118*	-0.00116*
	(0.000643)	(0.000632)
Social security	0.0173	0.0204
	(0.0362)	(0.0356)
Gross savings	0.0213	0.0231
	(0.0171)	(0.0168)
Old dependency ratio	0.0608	0.0575
	(0.0426)	(0.0419)
Young dependency ratio	-0.0241	-0.0239
	(0.0171)	(0.0168)
Protestant	-0.527	-0.549
	(1.069)	(1.051)
Catholic	-0.303	-0.347
	(0.579)	(0.569)
Orthodox	-1.409*	-1.356*
	(0.711)	(0.698)
Muslim	-1.765***	-1.804***
	(0.601)	(0.591)
Buddhist	-0.949	-1.010
	(1.023)	(1.005)
Hindus	1.334	1.085
	(1.736)	(1.706)
Legal origin_UK	0.541	0.550
	(0.793)	(0.779)
Legal origin_French	-0.414	-0.391
	(0.907)	(0.891)
Legal origin_Socialistic	-1.620	-1.688*
	(0.993)	(0.976)
Legal origin_German	0.112	0.162
	(0.815)	(0.801)
Constant	7.412**	7.125*
	(3.675)	(3.612)
Observations	82	82
R-squared	0.921	0.795
Adj. R-squared	0.893	0.724
Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1		

†† estimation using Dataset1 of 98 Countries, averages over 1989-2009

Table3- 8A: FE Estimation Results of Dataset of 56 Developing Economies over 1960-2009												
	FE	FE	FE	FE	FE	FE	FE	FE	FE	FE	FE	FE
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Variables	loglifden	loglifden	loglifden	loglifden	loglifden	loglifden	loglifpen	loglifpen	loglifpen	loglifpen	loglifpen	loglifpen
loggdppc	1.693***	1.663***	1.679***	1.977***	1.997***	1.989***	0.693***	0.663***	0.679***	0.977***	0.997***	0.989***
	(0.185)	(0.186)	(0.185)	(0.171)	(0.174)	(0.172)	(0.185)	(0.186)	(0.185)	(0.171)	(0.174)	(0.172)
agdy	-0.0238***	-0.0248***	-0.0243***	-0.00859**	-0.00827*	-0.00832*	-0.0238***	-0.0248***	-0.0243***	-0.00859**	-0.00827*	-0.00832*
	(0.00370)	(0.00376)	(0.00373)	(0.00434)	(0.00453)	(0.00443)	(0.00370)	(0.00376)	(0.00373)	(0.00434)	(0.00453)	(0.00443)
agdo	-0.0618	-0.0634*	-0.0607	-0.137***	-0.135***	-0.136***	-0.0618	-0.0634*	-0.0607	-0.137***	-0.135***	-0.136***
	(0.0385)	(0.0377)	(0.0380)	(0.0308)	(0.0307)	(0.0308)	(0.0385)	(0.0377)	(0.0380)	(0.0308)	(0.0307)	(0.0308)
agva	0.00991	0.00969	0.00964	0.0238***	0.0239***	0.0239***	0.00991	0.00969	0.00964	0.0238***	0.0239***	0.0239***
	(0.00799)	(0.00796)	(0.00798)	(0.00717)	(0.00718)	(0.00717)	(0.00799)	(0.00796)	(0.00798)	(0.00717)	(0.00718)	(0.00717)
gsav	-0.00982**	-0.0103***	-0.0100***	-0.00800**	-0.00802**	-0.00795**	-0.00982**	-0.0103***	-0.0100***	-0.00800**	-0.00802**	-0.00795**
	(0.00384)	(0.00385)	(0.00384)	(0.00351)	(0.00352)	(0.00352)	(0.00384)	(0.00385)	(0.00384)	(0.00351)	(0.00352)	(0.00352)
laginfcp	-0.000337***	-0.000331***	-0.000334***	-0.000208***	-0.000208***	-0.000208***	-0.000337***	-0.000331***	-0.000334***	-0.000208***	-0.000208***	-0.000208***
	(8.04e-05)	(8.04e-05)	(8.04e-05)	(6.85e-05)	(6.85e-05)	(6.85e-05)	(8.04e-05)	(8.04e-05)	(8.04e-05)	(6.85e-05)	(6.85e-05)	(6.85e-05)
tel	0.0191***	0.0195***	0.0194***	0.0124**	0.0122**	0.0122**	0.0191***	0.0195***	0.0194***	0.0124**	0.0122**	0.0122**
	(0.00566)	(0.00563)	(0.00565)	(0.00504)	(0.00507)	(0.00505)	(0.00566)	(0.00563)	(0.00565)	(0.00504)	(0.00507)	(0.00505)
sches				0.0114***	0.0116***	0.0115***				0.0114***	0.0116***	0.0115***
				(0.00213)	(0.00215)	(0.00213)				(0.00213)	(0.00215)	(0.00213)
schet	-0.00588	-0.00585	-0.00603				-0.00588	-0.00585	-0.00603			
	(0.00380)	(0.00373)	(0.00376)				(0.00380)	(0.00373)	(0.00376)			
liql	0.00105	0.00111	0.00114	0.00245*	0.00252*	0.00246*	0.00105	0.00111	0.00114	0.00245*	0.00252*	0.00246*
	(0.00148)	(0.00146)	(0.00148)	(0.00145)	(0.00144)	(0.00145)	(0.00148)	(0.00146)	(0.00148)	(0.00145)	(0.00144)	(0.00145)
lifex	0.0208**	0.0224***	0.0213**	0.0156*	0.0145*	0.0149*	0.0208**	0.0224***	0.0213**	0.0156*	0.0145*	0.0149*
	(0.00854)	(0.00852)	(0.00848)	(0.00809)	(0.00806)	(0.00805)	(0.00854)	(0.00852)	(0.00848)	(0.00809)	(0.00806)	(0.00805)
socs	-0.0264**	-0.0271**	-0.0269**	-0.000615	-0.000976	-0.000708	-0.0264**	-0.0271**	-0.0269**	-0.000615	-0.000976	-0.000708
	(0.0131)	(0.0130)	(0.0131)	(0.0121)	(0.0121)	(0.0121)	(0.0131)	(0.0130)	(0.0131)	(0.0121)	(0.0121)	(0.0121)
readir	-0.000589	-0.000578	-0.000589	-0.000551	-0.000563	-0.000554	-0.000589	-0.000578	-0.000589	-0.000551	-0.000563	-0.000554
	(0.00107)	(0.00106)	(0.00106)	(0.00107)	(0.00107)	(0.00107)	(0.00107)	(0.00106)	(0.00106)	(0.00107)	(0.00107)	(0.00107)
democ	-0.00384			0.00719			-0.00384			0.00719		
	(0.00884)			(0.00809)			(0.00884)			(0.00809)		
autoc		0.0149			-0.00897			0.0149			-0.00897	
		(0.0122)			(0.0115)			(0.0122)			(0.0115)	
polity2			-0.00484			0.00464			-0.00484			0.00464
			(0.00549)			(0.00514)			(0.00549)			(0.00514)
schet	-0.00588	-0.00585	-0.00603				-0.00588	-0.00585	-0.00603			
	(0.00380)	(0.00373)	(0.00376)				(0.00380)	(0.00373)	(0.00376)			
Constant	-9.906***	-9.751***	-9.809***	-13.38***	-13.45***	-13.43***	-9.906***	-9.751***	-9.809***	-13.38***	-13.45***	-13.43***
	(1.518)	(1.510)	(1.514)	(1.476)	(1.500)	(1.486)	(1.518)	(1.510)	(1.514)	(1.476)	(1.500)	(1.486)
Observations	440	440	440	527	527	527	440	440	440	527	527	527
R-squared	0.752	0.753	0.753	0.719	0.719	0.719	0.550	0.552	0.551	0.511	0.511	0.511
Number of id (countries)	38	38	38	39	39	39	38	38	38	39	39	39
Adj. R-squared	0.720	0.721	0.721	0.689	0.689	0.689	0.492	0.494	0.493	0.458	0.458	0.458

Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1; FE=Fixed Effects; investigating bequest motive

Table 3-8 B: CCEP Estimation Results of Dataset of 56 Developing Economies over 1960-2009												
	CCEP	CCEP	CCEP	CCEP	CCEP	CCEP	CCEP	CCEP	CCEP	CCEP	CCEP	CCEP
	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)
Variables	loglifden	loglifden	loglifden	loglifden	loglifden	loglifden	loglifpen	loglifpen	loglifpen	loglifpen	loglifpen	loglifpen
loggdppc	2.064***	2.088***	2.079***	1.754***	1.718***	1.738***	1.055***	1.082***	1.072***	0.732***	0.699***	0.717***
	(0.187)	(0.192)	(0.189)	(0.205)	(0.208)	(0.207)	(0.188)	(0.193)	(0.190)	(0.206)	(0.209)	(0.207)
agdy	-0.0226***	-0.0225***	-0.0224***	-0.0303***	-0.0313***	-0.0309***	-0.0229***	-0.0227***	-0.0227***	-0.0304***	-0.0313***	-0.0309***
	(0.00761)	(0.00766)	(0.00764)	(0.00810)	(0.00812)	(0.00812)	(0.00763)	(0.00767)	(0.00765)	(0.00808)	(0.00809)	(0.00810)
agdo	-0.116***	-0.117***	-0.117***	-0.0688	-0.0678	-0.0666	-0.118***	-0.117***	-0.118***	-0.0675	-0.0670	-0.0654
	(0.0370)	(0.0368)	(0.0369)	(0.0426)	(0.0416)	(0.0421)	(0.0370)	(0.0368)	(0.0369)	(0.0425)	(0.0415)	(0.0420)
agva	0.0210***	0.0208***	0.0211***	0.00741	0.00713	0.00712	0.0207***	0.0205***	0.0208***	0.00629	0.00598	0.00597
	(0.00747)	(0.00748)	(0.00747)	(0.00852)	(0.00849)	(0.00851)	(0.00750)	(0.00751)	(0.00751)	(0.00856)	(0.00854)	(0.00856)
gsav	-0.00670*	-0.00660*	-0.00664*	-0.00916**	-0.00960**	-0.00935**	-0.00674*	-0.00669*	-0.00670*	-0.00912**	-0.00956**	-0.00932**
	(0.00362)	(0.00362)	(0.00362)	(0.00392)	(0.00393)	(0.00393)	(0.00362)	(0.00362)	(0.00362)	(0.00392)	(0.00393)	(0.00392)
laginfcp	-0.000203***	-0.000208***	-0.000206***	-0.000298***	-0.000293***	-0.000296***	-0.000203***	-0.000207***	-0.000205***	-0.000297***	-0.000293***	-0.000296***
	(7.09e-05)	(7.11e-05)	(7.09e-05)	(8.36e-05)	(8.37e-05)	(8.37e-05)	(7.09e-05)	(7.11e-05)	(7.10e-05)	(8.35e-05)	(8.35e-05)	(8.35e-05)
tel	0.00751	0.00729	0.00722	0.0143**	0.0145**	0.0144**	0.00841	0.00788	0.00803	0.0145**	0.0145**	0.0146**
	(0.00553)	(0.00554)	(0.00554)	(0.00622)	(0.00616)	(0.00620)	(0.00546)	(0.00549)	(0.00548)	(0.00616)	(0.00612)	(0.00615)
sches	0.0128***	0.0130***	0.0129***				0.0127***	0.0129***	0.0128***			
	(0.00224)	(0.00227)	(0.00225)				(0.00225)	(0.00228)	(0.00226)			
schet				-0.00696*	-0.00685*	-0.00700*				-0.00696*	-0.00678*	-0.00697*
				(0.00403)	(0.00397)	(0.00399)				(0.00402)	(0.00396)	(0.00398)
liql	0.00170	0.00175	0.00170	0.000557	0.000571	0.000598	0.00171	0.00176	0.00170	0.000599	0.000585	0.000627
	(0.00151)	(0.00151)	(0.00151)	(0.00156)	(0.00154)	(0.00155)	(0.00151)	(0.00151)	(0.00151)	(0.00156)	(0.00154)	(0.00155)
lifex	0.0182**	0.0169**	0.0174**	0.0207**	0.0218**	0.0210**	0.0175**	0.0161*	0.0167*	0.0195**	0.0203**	0.0197**
	(0.00859)	(0.00850)	(0.00851)	(0.00905)	(0.00901)	(0.00899)	(0.00861)	(0.00853)	(0.00854)	(0.00906)	(0.00901)	(0.00900)
socs	-1.89e-05	-2.89e-05	-4.70e-05	-0.0255*	-0.0265**	-0.0261*	-0.000973	-0.00113	-0.00106	-0.0274**	-0.0285**	-0.0281**
	(0.0124)	(0.0123)	(0.0123)	(0.0134)	(0.0133)	(0.0134)	(0.0124)	(0.0124)	(0.0124)	(0.0135)	(0.0134)	(0.0134)
readir	-0.000741	-0.000785	-0.000785	-0.000874	-0.000862	-0.000869	-0.000603	-0.000658	-0.000638	-0.000718	-0.000702	-0.000708
	(0.00107)	(0.00107)	(0.00107)	(0.00107)	(0.00106)	(0.00107)	(0.00107)	(0.00107)	(0.00107)	(0.00106)	(0.00106)	(0.00106)
democ	0.0102			-0.00340			0.00943			-0.00370		
	(0.00834)			(0.00938)			(0.00832)			(0.00935)		
autoc		-0.0127			0.0134			-0.0127			0.0129	
		(0.0118)			(0.0125)			(0.0118)			(0.0125)	
polity2			0.00628			-0.00407			0.00609			-0.00405
			(0.00526)			(0.00567)			(0.00526)			(0.00567)
schet				-0.00696*	-0.00685*	-0.00700*				-0.00696*	-0.00678*	-0.00697*
				(0.00403)	(0.00397)	(0.00399)				(0.00402)	(0.00396)	(0.00398)
Constant	10.74	11.99	11.96	32.96*	33.80*	33.34*	6.999	9.170	8.273	33.00*	34.47*	33.57*
	(18.04)	(18.31)	(18.17)	(18.75)	(18.86)	(18.84)	(17.52)	(17.80)	(17.63)	(18.52)	(18.78)	(18.67)
Observations	527	527	527	440	440	440	527	527	527	440	440	440
R-squared	0.729	0.729	0.729	0.765	0.766	0.765	0.528	0.529	0.529	0.575	0.576	0.575
Number of id (countries)	39	39	39	38	38	38	39	39	39	38	38	38
Adj. R-squared	0.691	0.691	0.691	0.725	0.726	0.725	0.462	0.462	0.462	0.502	0.503	0.503

Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Table3- 9A: FE Estimation Results of Dataset of 26 Advanced Economies over 1960-2009												
	FE	FE	FE	FE	FE	FE	FE	FE	FE	FE	FE	FE
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Variables	loglifden	loglifden	loglifden	loglifden	loglifden	loglifden	loglifpen	loglifpen	loglifpen	loglifpen	loglifpen	loglifpen
loggdppc	1.489***	1.355***	1.489***	1.505***	1.310***	1.505***	0.489	0.355	0.489	0.505	0.310	0.505
	(0.312)	(0.314)	(0.312)	(0.326)	(0.326)	(0.326)	(0.312)	(0.314)	(0.312)	(0.326)	(0.326)	(0.326)
agdy	0.0135	0.0120	0.0135	0.0147*	0.0132	0.0147*	0.0135	0.0120	0.0135	0.0147*	0.0132	0.0147*
	(0.00908)	(0.00918)	(0.00908)	(0.00859)	(0.00870)	(0.00859)	(0.00908)	(0.00918)	(0.00908)	(0.00859)	(0.00870)	(0.00859)
agdo	0.0626***	0.0580***	0.0626***	0.0629***	0.0577***	0.0629***	0.0626***	0.0580***	0.0626***	0.0629***	0.0577***	0.0629***
	(0.00954)	(0.00956)	(0.00954)	(0.00950)	(0.00953)	(0.00950)	(0.00954)	(0.00956)	(0.00954)	(0.00950)	(0.00953)	(0.00950)
agva	-0.0233	-0.0173	-0.0233	-0.0301	-0.0258	-0.0301	-0.0233	-0.0173	-0.0233	-0.0301	-0.0258	-0.0301
	(0.0201)	(0.0202)	(0.0201)	(0.0198)	(0.0201)	(0.0198)	(0.0201)	(0.0202)	(0.0201)	(0.0198)	(0.0201)	(0.0198)
gsav	0.0136**	0.0168***	0.0136**	0.0120**	0.0157***	0.0120**	0.0136**	0.0168***	0.0136**	0.0120**	0.0157***	0.0120**
	(0.00540)	(0.00538)	(0.00540)	(0.00539)	(0.00537)	(0.00539)	(0.00540)	(0.00538)	(0.00540)	(0.00539)	(0.00537)	(0.00539)
laginfcp	-0.00135**	-0.00179***	-0.00135**	-0.00135**	-0.00180***	-0.00135**	-0.00135**	-0.00179***	-0.00135**	-0.00135**	-0.00180***	-0.00135**
	(0.000604)	(0.000598)	(0.000604)	(0.000604)	(0.000599)	(0.000604)	(0.000604)	(0.000598)	(0.000604)	(0.000604)	(0.000599)	(0.000604)
tel	0.0310***	0.0333***	0.0310***	0.0302***	0.0330***	0.0302***	0.0310***	0.0333***	0.0310***	0.0302***	0.0330***	0.0302***
	(0.00336)	(0.00334)	(0.00336)	(0.00335)	(0.00331)	(0.00335)	(0.00336)	(0.00334)	(0.00336)	(0.00335)	(0.00331)	(0.00335)
sches				0.000333	0.000293	0.000333				0.000333	0.000293	0.000333
				(0.000260)	(0.000263)	(0.000260)				(0.000260)	(0.000263)	(0.000260)
liql	-0.000298*	-0.000236	-0.000298*	-0.000314**	-0.000245	-0.000314**	-0.000298*	-0.000236	-0.000298*	-0.000314**	-0.000245	-0.000314**
	(0.000153)	(0.000154)	(0.000153)	(0.000153)	(0.000154)	(0.000153)	(0.000153)	(0.000154)	(0.000153)	(0.000153)	(0.000154)	(0.000153)
lifex	-0.0162	0.00849	-0.0162	-0.0246	0.00173	-0.0246	-0.0162	0.00849	-0.0162	-0.0246	0.00173	-0.0246
	(0.0331)	(0.0327)	(0.0331)	(0.0329)	(0.0325)	(0.0329)	(0.0331)	(0.0327)	(0.0331)	(0.0329)	(0.0325)	(0.0329)
socs	0.0334***	0.0335***	0.0334***	0.0321***	0.0312***	0.0321***	0.0334***	0.0335***	0.0334***	0.0321***	0.0312***	0.0321***
	(0.00724)	(0.00733)	(0.00724)	(0.00754)	(0.00764)	(0.00754)	(0.00724)	(0.00733)	(0.00724)	(0.00754)	(0.00764)	(0.00754)
readir	-0.0266**	-0.0206	-0.0266**	-0.0267**	-0.0204	-0.0267**	-0.0266**	-0.0206	-0.0266**	-0.0267**	-0.0204	-0.0267**
	(0.0128)	(0.0128)	(0.0128)	(0.0128)	(0.0128)	(0.0128)	(0.0128)	(0.0128)	(0.0128)	(0.0128)	(0.0128)	(0.0128)
schet	0.00104	0.00100	0.00104				0.00104	0.00100	0.00104			
	(0.00190)	(0.00192)	(0.00190)				(0.00190)	(0.00192)	(0.00190)			
democ	0.308***			0.327***			0.308***			0.327***		
	(0.0881)			(0.0889)			(0.0881)			(0.0889)		
polity2			0.308***			0.327***			0.308***			0.327***
			(0.0881)			(0.0889)			(0.0881)			(0.0889)
Constant	-13.99***	-11.53***	-13.99***	-13.69***	-10.57**	-13.69***	-13.99***	-11.53***	-13.99***	-13.69***	-10.57**	-13.69***
	(4.356)	(4.351)	(4.356)	(4.392)	(4.368)	(4.392)	(4.356)	(4.351)	(4.356)	(4.392)	(4.368)	(4.392)
Observations	487	487	487	487	487	487	487	487	487	487	487	487
R-squared	0.829	0.824	0.829	0.827	0.822	0.827	0.719	0.711	0.719	0.715	0.707	0.715
Number of id (countries)	22	22	22	22	22	22	22	22	22	22	22	22
Adj. R-squared	0.815	0.811	0.815	0.813	0.808	0.813	0.697	0.690	0.697	0.693	0.685	0.693

Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Table 3-9 B: CCEP Estimation Results of Dataset of 26 Advanced Economies over 1960-2009												
	CCEP	CCEP	CCEP	CCEP	CCEP	CCEP	CCEP	CCEP	CCEP	CCEP	CCEP	CCEP
	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)
Variables	loglifden	loglifden	loglifden	loglifden	loglifden	loglifden	loglifpen	loglifpen	loglifpen	loglifpen	loglifpen	loglifpen
loggdppc	1.135***	0.872**	1.126***	1.323***	1.143***	1.310***	0.0926	-0.164	0.0742	0.299	0.123	0.279
	(0.340)	(0.339)	(0.340)	(0.319)	(0.321)	(0.319)	(0.339)	(0.338)	(0.339)	(0.318)	(0.319)	(0.318)
agdy	0.0160	0.0115	0.0181*	0.0187*	0.0141	0.0209*	0.0167*	0.0122	0.0193*	0.0193*	0.0146	0.0219**
	(0.00999)	(0.0101)	(0.0103)	(0.0104)	(0.0104)	(0.0107)	(0.00985)	(0.00992)	(0.0101)	(0.0103)	(0.0103)	(0.0105)
agdo	0.0261**	0.0193	0.0216*	0.0234*	0.0164	0.0189	0.0233**	0.0161	0.0175	0.0202*	0.0128	0.0145
	(0.0119)	(0.0127)	(0.0127)	(0.0121)	(0.0129)	(0.0129)	(0.0118)	(0.0126)	(0.0127)	(0.0121)	(0.0129)	(0.0129)
agva	-0.0348*	-0.0293	-0.0384*	-0.0308	-0.0220	-0.0344*	-0.0359*	-0.0310	-0.0403**	-0.0317	-0.0234	-0.0362*
	(0.0204)	(0.0210)	(0.0207)	(0.0206)	(0.0210)	(0.0209)	(0.0202)	(0.0208)	(0.0205)	(0.0204)	(0.0209)	(0.0207)
gsav	0.00507	0.00836	0.00512	0.00483	0.00801	0.00493	0.00508	0.00823	0.00514	0.00477	0.00787	0.00489
	(0.00532)	(0.00535)	(0.00532)	(0.00541)	(0.00544)	(0.00541)	(0.00530)	(0.00532)	(0.00529)	(0.00539)	(0.00542)	(0.00538)
laginfcp	-0.00120**	-0.00162***	-0.00130**	-0.00114*	-0.00157**	-0.00125**	-0.00129**	-0.00171***	-0.00143**	-0.00122**	-0.00165***	-0.00136**
	(0.000605)	(0.000611)	(0.000613)	(0.000609)	(0.000614)	(0.000618)	(0.000603)	(0.000610)	(0.000614)	(0.000607)	(0.000613)	(0.000618)
tel	0.0224***	0.0284***	0.0227***	0.0229***	0.0286***	0.0233***	0.0224***	0.0283***	0.0228***	0.0228***	0.0285***	0.0232***
	(0.00409)	(0.00392)	(0.00408)	(0.00414)	(0.00400)	(0.00414)	(0.00407)	(0.00391)	(0.00406)	(0.00413)	(0.00398)	(0.00412)
sches	0.000227	0.000217	0.000233				0.000199	0.000189	0.000204			
	(0.000262)	(0.000267)	(0.000262)				(0.000261)	(0.000266)	(0.000261)			
liql	-0.000267	-0.000164	-0.000248	-0.000210	-0.000106	-0.000195	-0.000268	-0.000154	-0.000246	-0.000201	-8.44e-05	-0.000182
	(0.000188)	(0.000185)	(0.000184)	(0.000188)	(0.000184)	(0.000185)	(0.000187)	(0.000184)	(0.000183)	(0.000187)	(0.000184)	(0.000183)
lifex	0.00649	0.0303	0.00926	0.0109	0.0323	0.0137	0.00869	0.0330	0.0123	0.0118	0.0337	0.0152
	(0.0332)	(0.0334)	(0.0331)	(0.0328)	(0.0330)	(0.0327)	(0.0330)	(0.0333)	(0.0330)	(0.0326)	(0.0329)	(0.0325)
socs	0.0284***	0.0286***	0.0274***	0.0326***	0.0346***	0.0316***	0.0264***	0.0265***	0.0248***	0.0309***	0.0327***	0.0293***
	(0.00775)	(0.00790)	(0.00782)	(0.00760)	(0.00773)	(0.00768)	(0.00778)	(0.00793)	(0.00787)	(0.00761)	(0.00775)	(0.00771)
readir	-0.0432***	-0.0333***	-0.0427***	-0.0401***	-0.0300**	-0.0396***	-0.0426***	-0.0325**	-0.0419***	-0.0392***	-0.0290**	-0.0385***
	(0.0127)	(0.0127)	(0.0127)	(0.0127)	(0.0127)	(0.0127)	(0.0127)	(0.0127)	(0.0126)	(0.0127)	(0.0127)	(0.0126)
schet				-0.00101	-0.000588	-0.000973				-0.00103	-0.000550	-0.000987
				(0.00199)	(0.00201)	(0.00198)				(0.00198)	(0.00200)	(0.00197)
democ	0.378***			0.364***			0.372***			0.360***		
	(0.0897)			(0.0893)			(0.0893)			(0.0890)		
polity2			0.373***			0.359***			0.366***			0.353***
			(0.0893)			(0.0890)			(0.0889)			(0.0886)
Constant	-27.60	-27.80	-26.82	-41.58*	-43.47*	-40.61*	-24.04	-24.88	-21.51	-38.56*	-40.93*	-35.85
	(23.93)	(24.17)	(23.93)	(23.81)	(24.04)	(23.82)	(23.50)	(23.67)	(23.59)	(23.33)	(23.50)	(23.42)
Observations	487	487	487	487	487	487	487	487	487	487	487	487
R-squared	0.848	0.841	0.848	0.849	0.843	0.849	0.752	0.742	0.752	0.754	0.744	0.755
Number of id (countries)	22	22	22	22	22	22	22	22	22	22	22	22
Adj. R-squared	0.831	0.824	0.831	0.832	0.825	0.832	0.724	0.713	0.725	0.726	0.716	0.727

Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Table3- 10A: FE Estimation Results of Dataset of 14 Transitional Economies over 1986-2009

	FE	FE	FE	FE	FE	FE	FE	FE	FE	FE	FE	FE
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Variables	loglifden	loglifden	loglifden	loglifden	loglifden	loglifden	loglifpen	loglifpen	loglifpen	loglifpen	loglifpen	loglifpen
loggdppc	0.897	1.064	0.991	1.562**	1.813**	1.670**	-0.103	0.0643	-0.00883	0.562	0.813	0.670
	(0.751)	(0.732)	(0.743)	(0.751)	(0.735)	(0.743)	(0.751)	(0.732)	(0.743)	(0.751)	(0.735)	(0.743)
agdy	0.0362	0.0426	0.0399	0.0113	0.0212	0.0173	0.0362	0.0426	0.0399	0.0113	0.0212	0.0173
	(0.0432)	(0.0433)	(0.0432)	(0.0446)	(0.0451)	(0.0447)	(0.0432)	(0.0433)	(0.0432)	(0.0446)	(0.0451)	(0.0447)
agdo	0.142	0.123	0.136	0.172*	0.153*	0.175*	0.142	0.123	0.136	0.172*	0.153*	0.175*
	(0.0861)	(0.0863)	(0.0891)	(0.0872)	(0.0881)	(0.0899)	(0.0861)	(0.0863)	(0.0891)	(0.0872)	(0.0881)	(0.0899)
agva	-0.0785***	-0.0761***	-0.0769***	-0.0687***	-0.0648***	-0.0660***	-0.0785***	-0.0761***	-0.0769***	-0.0687***	-0.0648***	-0.0660***
	(0.0236)	(0.0237)	(0.0236)	(0.0244)	(0.0247)	(0.0245)	(0.0236)	(0.0237)	(0.0236)	(0.0244)	(0.0247)	(0.0245)
gsav	-0.0111	-0.00929	-0.0103	-0.0132	-0.0112	-0.0126	-0.0111	-0.00929	-0.0103	-0.0132	-0.0112	-0.0126
	(0.00940)	(0.00925)	(0.00942)	(0.00965)	(0.00960)	(0.00966)	(0.00940)	(0.00925)	(0.00942)	(0.00965)	(0.00960)	(0.00966)
laginfcp	-0.000309	-0.000343	-0.000325	-4.94e-05	-6.92e-05	-6.12e-05	-0.000309	-0.000343	-0.000325	-4.94e-05	-6.92e-05	-6.12e-05
	(0.000397)	(0.000397)	(0.000398)	(0.000392)	(0.000395)	(0.000393)	(0.000397)	(0.000397)	(0.000398)	(0.000392)	(0.000395)	(0.000393)
tel	0.00663	0.00474	0.00572	0.0129	0.0106	0.0122	0.00663	0.00474	0.00572	0.0129	0.0106	0.0122
	(0.0121)	(0.0120)	(0.0122)	(0.0123)	(0.0123)	(0.0123)	(0.0121)	(0.0120)	(0.0122)	(0.0123)	(0.0123)	(0.0123)
sches				0.0126	0.0101	0.0126				0.0126	0.0101	0.0126
				(0.0126)	(0.0129)	(0.0129)				(0.0126)	(0.0129)	(0.0129)
liql	0.0168**	0.0151*	0.0159**	0.0148*	0.0124	0.0138*	0.0168**	0.0151*	0.0159**	0.0148*	0.0124	0.0138*
	(0.00789)	(0.00770)	(0.00784)	(0.00819)	(0.00806)	(0.00814)	(0.00789)	(0.00770)	(0.00784)	(0.00819)	(0.00806)	(0.00814)
lifex	-0.172**	-0.175**	-0.173**	-0.0934	-0.0892	-0.0946	-0.172**	-0.175**	-0.173**	-0.0934	-0.0892	-0.0946
	(0.0805)	(0.0807)	(0.0807)	(0.0768)	(0.0776)	(0.0774)	(0.0805)	(0.0807)	(0.0807)	(0.0768)	(0.0776)	(0.0774)
democ	-0.0414			-0.0666*			-0.0414			-0.0666*		
	(0.0360)			(0.0397)			(0.0360)			(0.0397)		
socs	0.0169	0.0163	0.0169	0.0173	0.0149	0.0186	0.0169	0.0163	0.0169	0.0173	0.0149	0.0186
	(0.0263)	(0.0266)	(0.0265)	(0.0292)	(0.0300)	(0.0298)	(0.0263)	(0.0266)	(0.0265)	(0.0292)	(0.0300)	(0.0298)
readir	-0.0237	-0.0232	-0.0235	-0.0209	-0.0203	-0.0207	-0.0237	-0.0232	-0.0235	-0.0209	-0.0203	-0.0207
	(0.0277)	(0.0278)	(0.0277)	(0.0285)	(0.0287)	(0.0285)	(0.0277)	(0.0278)	(0.0277)	(0.0285)	(0.0287)	(0.0285)
schet	0.0254***	0.0263***	0.0256***				0.0254***	0.0263***	0.0256***			
	(0.00912)	(0.00911)	(0.00916)				(0.00912)	(0.00911)	(0.00916)			
autoc		0.0399			0.0712			0.0399			0.0712	
		(0.0610)			(0.0692)			(0.0610)			(0.0692)	
polity2			-0.0222			-0.0427			-0.0222			-0.0427
			(0.0261)			(0.0294)			(0.0261)			(0.0294)
Constant	2.682	1.457	1.890	-8.348	-10.76	-9.536	2.682	1.457	1.890	-8.348	-10.76	-9.536
	(8.175)	(8.137)	(8.142)	(7.480)	(7.420)	(7.418)	(8.175)	(8.137)	(8.142)	(7.480)	(7.420)	(7.418)
Observations	147	147	147	146	146	146	147	147	147	146	146	146
R-squared	0.657	0.654	0.655	0.639	0.634	0.637	0.527	0.524	0.525	0.503	0.496	0.500
Number of id (countries)	13	13	13	13	13	13	13	13	13	13	13	13

Standard errors in parentheses, *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table 3-10 B: CCEP Results of Dataset of 14 Transitional Economies over the Period 1986-2009

	CCEP	CCEP	CCEP	CCEP	CCEP	CCEP	CCEP	CCEP	CCEP	CCEP	CCEP	CCEP
	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)
Variables	loglifden	loglifden	loglifden	loglifden	loglifden	loglifden	loglifpen	loglifpen	loglifpen	loglifpen	loglifpen	loglifpen
loggdppc	-0.232	-0.108	-0.158	-0.860	-1.125	-0.805	-1.604	-1.356	-1.470	-1.958*	-2.091**	-1.863*
	(1.138)	(1.119)	(1.135)	(1.089)	(1.045)	(1.072)	(1.062)	(1.044)	(1.062)	(1.016)	(0.987)	(1.009)
agdy	-0.00475	-0.0727	-0.0254	0.0745	-0.0179	0.0419	-0.0674	-0.104	-0.0694	0.000392	-0.0705	-0.00819
	(0.0766)	(0.0886)	(0.0781)	(0.0768)	(0.0847)	(0.0806)	(0.0738)	(0.0836)	(0.0745)	(0.0685)	(0.0788)	(0.0717)
agdo	0.201	0.00570	0.138	0.224	0.0221	0.141	-0.00634	-0.121	-0.0254	0.0118	-0.117	-0.0152
	(0.146)	(0.169)	(0.146)	(0.137)	(0.152)	(0.144)	(0.147)	(0.160)	(0.144)	(0.136)	(0.149)	(0.138)
agva	-0.114***	-0.118***	-0.113***	-0.140***	-0.160***	-0.147***	-0.119***	-0.122***	-0.118***	-0.132***	-0.148***	-0.139***
	(0.0280)	(0.0295)	(0.0284)	(0.0274)	(0.0283)	(0.0279)	(0.0258)	(0.0275)	(0.0263)	(0.0248)	(0.0261)	(0.0256)
gsav	-0.0136	-0.0120	-0.0128	-0.0188	-0.0148	-0.0145	-0.0196*	-0.0166	-0.0183*	-0.0237**	-0.0169*	-0.0191*
	(0.0115)	(0.0113)	(0.0115)	(0.0117)	(0.0108)	(0.0115)	(0.0108)	(0.0107)	(0.0109)	(0.0106)	(0.0101)	(0.0106)
laginfcp	-0.000211	-0.000201	-0.000215	-0.000377	-0.000369	-0.000394	-8.08e-05	-7.10e-05	-8.61e-05	-0.000257	-0.000279	-0.000282
	(0.000440)	(0.000439)	(0.000440)	(0.000420)	(0.000406)	(0.000416)	(0.000414)	(0.000415)	(0.000416)	(0.000398)	(0.000389)	(0.000396)
tel	0.0580***	0.0569***	0.0576***	0.0398**	0.0396**	0.0373**	0.0546***	0.0527***	0.0535***	0.0376**	0.0373**	0.0351**
	(0.0181)	(0.0180)	(0.0181)	(0.0168)	(0.0158)	(0.0166)	(0.0169)	(0.0169)	(0.0171)	(0.0159)	(0.0151)	(0.0157)
sches	0.0289*	0.0232	0.0276*				0.0314**	0.0276*	0.0311**			
	(0.0161)	(0.0162)	(0.0161)				(0.0151)	(0.0153)	(0.0152)			
liql	0.0145	0.00871	0.0132	0.0192*	0.0150	0.0171*	0.0124	0.00798	0.0116	0.0127	0.0104	0.0118
	(0.0105)	(0.0103)	(0.0106)	(0.0101)	(0.00970)	(0.0101)	(0.00956)	(0.00932)	(0.00960)	(0.00910)	(0.00878)	(0.00912)
lifex	-0.235*	-0.220*	-0.228*	-0.244**	-0.257**	-0.249**	-0.145	-0.133	-0.140	-0.165	-0.187*	-0.170
	(0.122)	(0.122)	(0.122)	(0.117)	(0.113)	(0.116)	(0.114)	(0.114)	(0.115)	(0.110)	(0.109)	(0.110)
democ	-0.0635			0.0178			-0.0460			0.0357		
	(0.0546)			(0.0542)			(0.0514)			(0.0515)		
socs	-0.0164	-0.0221	-0.0170	-0.0222	-0.0380	-0.0253	-0.0143	-0.0194	-0.0137	-0.0160	-0.0306	-0.0174
	(0.0386)	(0.0390)	(0.0388)	(0.0337)	(0.0332)	(0.0335)	(0.0363)	(0.0368)	(0.0365)	(0.0318)	(0.0317)	(0.0319)
readir	-0.0247	-0.0242	-0.0244	-0.0279	-0.0286	-0.0277	-0.0386	-0.0369	-0.0378	-0.0405	-0.0397	-0.0394
	(0.0280)	(0.0280)	(0.0281)	(0.0266)	(0.0257)	(0.0264)	(0.0266)	(0.0266)	(0.0267)	(0.0254)	(0.0249)	(0.0253)
schet				0.0431***	0.0463***	0.0448***				0.0389***	0.0407***	0.0408***
				(0.0115)	(0.0109)	(0.0115)				(0.0104)	(0.00996)	(0.0104)
autoc		0.00889			-0.131			0.000886			-0.128	
		(0.122)			(0.112)			(0.113)			(0.107)	
polity2			-0.0395			0.0317			-0.0253			0.0447
			(0.0447)			(0.0444)			(0.0423)			(0.0424)
Constant	-24.73	65.76	8.078	-64.06	16.88	-40.35	(1.120)	(1.092)	(1.122)	(1.121)	(1.042)	(1.111)
	(85.36)	(110.0)	(86.75)	(75.22)	(91.97)	(80.62)	66.19	107.8	70.30	37.35	83.74	29.21
							(83.07)	(101.5)	(83.06)	(72.72)	(88.92)	(75.84)
Observations	143	143	143	144	144	144	143	143	143	144	144	144
R-squared	0.706	0.708	0.706	0.732	0.749	0.737	0.642	0.641	0.639	0.669	0.682	0.671
Number of id (countries)	13	13	13	13	13	13	13	13	13	13	13	13

Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Chapter 4:

Private Credit and Life Insurance Development: an International Analysis

4.1. Introduction

The world has experienced private credit expansion. For instance, by the end of 2006, the overall global outstanding amount of consumer credit provided by credit institutions exceeded €4 trillion, Wyman (2008). Such credit expansion is believed to boost economic growth and financial deepening (see IMF, 2004; and Iossifov and Khamis, 2009) including life insurance development. Nevertheless, the conjoint effect of private credit expansion with insurance development on economic growth remains an unsettled issue.

Recent studies on finance and economic growth (Beck and Levine, 2004; Loayza, and Ranciere, 2005; Favara, 2006; Saci, Giorgioni, and Holden 2009; Ghimire and Giorgioni, 2009) suggest that private credit has positive impact on economic growth in the long run, but negative impact in the short run.

A few other studies reported that insurance has positive impact on economic growth (Ward and Zurbruegg, 2000; Kugler and Ofoghi, 2005; Adams et al, 2006; Webb, Grace and Skipper, 2005; Arena, 2006; Han et al, 2010; and Haiss and Sümegi, 2008).[92]

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[92] Ward and Zurbruegg (2000) investigated the relationship between economic growth and growth in the insurance sector for nine OECD countries using total insurance premiums data (i.e., both life and nonlife) over the period 1961-1996 and vector autoregressive (VAR) model. They found evidence for a long run relationship between economic growth and insurance premiums growth in Australia, Canada, France, Italy, and Japan, but not for the U.S., the U.K., Switzerland and Austria. They also found that growth in insurance Granger cause growth in GDP only in Canada and Japan and a bicausal relationship in Italy. For other countries the feedback between growth in insurance and growth in GDP was statically insignificant. However, for the UK Kugler and Ofoghi (2005) using disaggregated insurance premiums data and Johansen's procedure reported most components of insurance premiums and economic growth exhibit long run relationship. Similarly, Adams et al (2006) using a multivariate

Webb, Grace, and Skipper (2002) and Arena (2006) emphasised the conjoint effect of credit with insurance on economic growth. Webb, Grace, and Skipper (2002) found that bank credit and life premiums have positive and significant impact on economic growth. However, they found that bank credit and life premiums have no independent significant impacts on economic growth when the growth regression equation includes an interaction term between these two variables. In this case, the conjoint effect is positive and significant. In contrast, Arena (2006) found that private credit and insurance premiums have positive and significant impact on economic growth and the interaction term has negative and significant impact on economic growth. He found that private credit has positive and significant impacts on economic growth only in specifications that do not include insurance premiums; in the specifications that include the two variables, only insurance premiums (life and nonlife) have positive and significant impact on economic growth.[93]

Nevertheless, existing research has paid little attention to the long run relationship between private credit and life insurance development. This chapter aims at filling this gap in the literature. This chapter aims at investigating whether there is a long run /equilibrium relationship between life insurance development and private credit

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vector autoregressive model and Johansen's cointegration test reported that, in Sweden over the period 1830-1998, economic growth, non bank public credit, and total insurance premiums exhibited a long run relationship. Using Granger causality Wald test they reported that for the entire period non bank public credit has promoted both economic growth and aggregate insurance premiums (both life and non life), and the role of insurance in enhancing the demand for non bank lending was weak.

While Webb, Grace and Skipper (2005) study, covered 55 countries over the period 1980-1996, and used three stage least squares (3SLS) method, Arena (2006) employed the generalised method of moments (GMM) for dynamic models of panel data developed by Arellano and Bond (1991) and Arellano and Bover (1995) and used data for 56 developed and developing countries over the years1976-2004. The two studies in addition to life and nonlife insurance penetration include in the growth regression equation indicators of banking and stock markets as explanatory variables. However, the studies of Han et al (2010) and Haiss and Sümegi (2008) were confined to the relationship between economic growth and insurance. While the former study used GMM and a data set of 77 countries over the period of 1994-2005, the latter used data for 29 European countries over the period 1992-2005, and employed panel data methods.

[93] Notably in Arena’s study the reported correlation between private credit and life premiums is 0.52 and that between private credit and nonlife premiums is 0.41 is reasonable and does not seem to hinder estimating the parameters of interest.

consumption, taking into account other control variables. If a long run relationship between life insurance development and private credit consumption exists what is the direction of causality. Does life insurance development causes private credit consumption expansion; private credit consumption causes life insurance development or a bi-directional causality relationship. The causal relationship between life insurance development and life insurance is rarely discussed in existing studies. Therefore we will investigate the following hypotheses:

Hypothesis 1: there is a long run relationship between life insurance development and private credit consumption.

Hypothesis 2: life insurance development causes private credit consumption expansion.

Hypothesis 3: private credit consumption expansion causes life insurance developments.

Hypothesis 4: there is a bi-directional causality relationship between life insurance development and private credit consumption expansion.

This chapter investigates empirically the relationship between life insurance premiums,[94] a measure of life insurance development and private credit consumption across countries. We use aggregate data on credit to the private sector that includes both households' credit and business credit.

This chapter contributes to the literature in several ways. The investigation represents a first attempt to undertake empirical analysis in assessing the long run economic relationship between private credit expansion and life insurance development across countries. It also incorporates informal credit as a possible

[94] Life insurance premiums data includes different types of life insurance policies and annuities. In addition to the pure insurance coverage, the policy may include a saving element for investment. The pure insurance coverage may be motivated by the bequest motive and /or consumption allocation over time.

determinant of life insurance development. We apply relatively newly developed econometric techniques for panel data that account for cross sectional factor and spatial dependency as well as unobserved heterogeneity. That is, we employ the CCEP Pooled estimator advanced by Pesaran (2006) that account for factor dependence, and spatial maximum likelihood estimator that account for spatial dependence.

The rest of the chapter is structured as follows: Section 4.2 briefly describes factors that explain life insurance development. Section 4.3 presents the economic model and empirical strategy. Section 4.4 describes data sources and measures. Diagnostic tests and estimation results are in Section 4.5 followed by conclusions in Section 4.6.

4.2. Factors Explaining Life Insurance Development

This section describes the factors that explain life insurance development in a Fisherian context to retain Yaari's (1965) terminology. Under some reasonable assumptions, allowing for the possibility of unrestricted lending and borrowing, Yaari (1965) proposed a Fisherian model for studying life insurance consumption. The Fisherian model stresses consumption expansion possibilities for the consumer while alive, i.e., the purchase of life insurance is motivated by the collateral motive to facilitate consumer borrowing against his/her future income streams. The consumer is assumed to be without bequest motive. The main factor is private credit consumption. Other factors include risk aversion, private credit from informal sources, price of life policy, interest rates, inflation, and religion.

4.2.1. Credit Consumption

The analysis of the relationship between income and consumption is one of the central issues in economics. Keynes (1961, p.96) argues that individual's consumption is determined by his/her current income. Although this may be true in the short term, in a longer time frame one needs to take into account future income streams as well. This has been accomplished by the permanent income hypothesis developed by Friedman (1957) and the life cycle hypotheses proposed by Modigliani and Brumberg (2005), and Ando and Modigliani (1963). The permanent income hypothesis and the life-cycle hypothesis predict that consumption depends on life time income streams and that a consumer saves or borrow to smooth consumption throughout his/her life. The hypotheses suggest that consumer's willingness to borrow will depend on the degree of his/her discount rate for future consumption/utility. In other words, risk-averse households can protect consumption levels by borrowing against their expected future income. For instance, Iossifov and Khamis (2009) suggest that recent credit expansion is driven, among other things, by consumers' desire to smooth consumption over the life-cycle. Backé and Wójcik (2008) also, among others, argue that households have engaged more intensively in consumption smoothing/borrowing against their expected future income.

However, the permanent income hypothesis and the life-cycle hypothesis do not explicitly deal with the impacts of lifetime uncertainty on consumer's choice of optimal allocation of consumption over time. Life insurance allows the sharing of lifetime uncertainty and expands the feasible set of consumption, Karni and Zilcha (1985, p.109). In a seminal article Yaari (1965) shows that a consumer without bequest motive is better off using life insurance. In Yaari's model the consumer maximizes the expected value of a Fisher utility function subject to the constraint that he/she is solvent at time of death.

To this end, a risk averse consumer (borrower) will be willing to pay premiums in return for coverage to be paid to the creditor in the event of consumer's premature death.[95] Such an insurance contract is called term insurance.[96] The coverage may be simply for a specified period. A creditor (beneficiary of the insurance policy) receives payment from the insurer if the death occurs during or before the end of the specified period. However if the borrower survives to the end of the specified period, the beneficiary/creditor does not receive insurance benefits.

The relationship between consumer credit and insurance is probably the most obvious one, as creditors often require insurance coverage for providing credit.[97] Soto (2009, p.14) argues that in the EU it is common by creditors to require taking out insurance, and that creditors frequently require insurance as a condition for granting consumer credit. Given that insurance coverage is a secondary product in the market for consumer credit it seems logical to view developments in the credit

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[95] Theoretical works (Fortune, 1973; Campbell, 1980; Lewis, 1989) have shown that the demand for life insurance depends, among other things, on individual's risk aversion.

[96] Notably, according to OFT, 2006, there are various products that aim at providing coverage (repayment of a credit) for the lender in case of the borrower default; it includes coverage against mortality risk/life insurance (L), income protection or Permanent Health Insurance (PHI)-disability-, Critical Illness Insurance (CI) such as a heart attack or a cancer, involuntary unemployment risk (U),coverage against sickness(S), coverage against accident (A) and mortgage payment protection insurance (MPPI). MPPI provides coverage against the risks of accident, sickness or unemployment. MPPI, CI, U, S, and A can be purchased as an alternative or to complement PHI. Main differences between these policies according to OFT, 2006 are that L and PHI are long term policies, eligibility and pricing take into account individual circumstances. By contrast U, S, and A are short term policies, universally available insurance products that can be arranged quickly at the point sale, though they do not provide coverage against premature death and unemployment. Whether insurance coverage is provided by life insurance or general insurance depends on the structure of the insurance in a country. In the UK, for instance, CI and PHI are provided by life insurers, whereas MPPI and sometime UI are typically supplied by general insurers, Ford et al (2004, p.20). In the US also mortgage insurance and PHI is provided by general insurers. Ford et al (2004, p.45) report that about 60 percent of borrowers participated in a random sample survey of borrowers with mortgages from 1993 onwards to 2002, in the UK had one or more of the following insurance schemes: MPPI (37 percent), CI (40 percent), PHI (20 percent), U (12 percent).

[97] Given that insurance is often distributed by lenders and consumer's limited information about insurance products, previous work on credit life insurance is at a country level and focuses on consumer protection, (Barron, and Staten, 1995; Durkin, 2002; Cyrnak and Canner, 1986; Ashton and Hudson, 2010 and Ford et al, 2004).

market in relation to insurance markets (see OFT, 2006). For instance, in the US, according to the American Council of Life Insurers, (2009), by the end of 2008 life insurance in force for credit/loan on 10 years or less duration was estimated at $148 billion.[98]

Consumer credit may take the form of personal loans (either for general purpose or specified one), the purchase of durable goods (e.g., cars, and furniture), or revolving credit such as credit cards, Soto (2009, p.13).[99] Loan terms usually vary from a minimum of 1 year to a maximum of 10 years or even longer. Credit and loans are provided by banks, finance companies, credit unions, building societies, retailers and point-of-sale finance. These institutions often attach insurance coverage to consumer credit and are sold as a package (see Soto, 2009; for the UK see OFT, 2006, pp.11-14). In other words, lenders act as distributors for insurance products.

4.2.2. Price of Life Policy

Economic theory predicts an inverse relationship between the demand for a service and its price. The price of life insurance coverage consists of the expected loss (actuarial fair price) and loading expenses. Campbell (1980) has shown that for a risk averse household, the optimal life insurance coverage is a decreasing function of insurance loading. Browne and Kim (1993) report negative and significant relationship between the demand for life insurance and its price.

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[98]However, data on credit life insurance for credit/loans longer than 10 years duration is included in other policies.
[99] While in the former two types, the borrower is provided with a fixed amount to be repaid by means of instalments, in the latter, the creditor provides the borrower with a reserve of credit, Soto (2009, p.13.).

4.2.3. Informal Credit

Informal finance transactions include, among other things, credit, and insurance, occurring outside the formal financial sector. Loans from relatives, friends, neighbours, and rotating savings and credit associations are common in large parts of developing countries. Such loans are based on reciprocity and do not require collateral. The lender anticipates to get a loan from the borrower sometime in the future should the need arise. Other informal sources of credit include money lenders. Informal money lenders are still an important source of credit in the developing world.[100] Informal lenders use collateral substitutes such as third-party guarantee, relationship with the borrower, charging high interest rates, and limiting size and duration of the loan. It is believed that informal lenders charge high interest rates, sometimes higher than that charged by formal institutions, (see Hoff and Stiglitz, 1990). One explanation for the high interest rates is that informal money lenders charge a risk premium for coverage in case of default, (see Bottomley, 1963).[101] Llanto (1989) suggests that collateral substitutes

> *" are: a) third party guarantees where the loan is given on the strength of a guarantee provided by a third person, usually somebody with the means to repay the loan if the original borrower defaults; (b) tied contracts where the loan is given on the promise or agreement that the lender will be the sole or principal buyer of the produce at mutually acceptable implicit interest rate; (c) threat of loss of future borrowing opportunities which for as long as it represents a credible threat is an effective means to keep the integrity of the loan contract; and (d) the mortgaging of tenancy or cultivation fights which affords the mortgagee to derive actual and beneficial use of the land which yields him returns over and above the earnings derived from the principal*." pp.153-154.

Therefore, these informal institutions need to be taken into account when studying the relationship between life insurance and private credit consumption. We will

[100] For instance, the Asian Development Bank (1990) estimated, as cited in Ghate (1992) that the share of informal credit in rural areas in Asian countries ranges from a third to three quarters of the total loans.

[101] The World Bank Economic Review issued special volume on imperfect information and rural credit market in developing countries (Volume 4 September 1990 Number 3). Hoff and Stiglitz (1990) noted, among other features of informal credit markets, interlinkages between informal credit transactions and other informal transactions, see also other papers in the Volume 4 and Bell and Srinivasan (1989).

hypothesise that informal credit mechanisms/ institutions are a substitute for life insurance since informal credit institutions use collateral substitutes instead of life insurance.

4.2.4. Inflation

A life insurance contract is a promise by the insurer to pay insurance coverage to the lender in the event of the borrower's death. The impact of inflation on life insurance may be positive. That is, a consumer may need to borrow more to cover his expenses -ceteris paribus- in periods of high prices than in periods of low prices. Since credit consumption is connected to life insurance purchase (by assumption), the more credit consumption is -*ceteris paribus*- the more life insurance coverage is bought. Wood (1964, p.416.) indicated that there are similarities between consumer credit and policy loans. Permanent life insurance policies allow policyholders to borrow against their policies, Smith (1982). Policyholders' use of such a borrowing is explained, among other things, by the so called inflation hypothesis. The hypothesis predicts that increased policy holders' demand for credit in periods of high inflation to finance their increased current expenditures, Liebenberg, Carson, and Hoyt (2010). Empirical work on policy loans reports evidence for the inflation hypothesis (Liebenberg, Carson, and Hoyt, 2010; Schott, 1971; and Carson and Hoyt, 1992).

Therefore, we hypothesise a positive effect of inflation on the demand for life insurance.

4.2.5. Real Interest Rates

The relationship between real interest rates and life insurance consumption is likely to be ambiguous. On the one hand, higher interest rates will induce creditors to offer more credit to policy holders. On the other, high interest rates may make consumers reduce their borrowing through life insurance. Therefore, the impact of interest rates on the demand for life insurance is likely to be ambiguous.

Beck and Webb (2003) using real lending interest rates report positive and significant relationship between real interest rates and life insurance consumption.

4.2.6. Religion

North (1997) noted that ideological attitudes and perceptions about fairness and justice that constitute individuals' frames of reference for political and individual choices do matter. In this context, religion has historically influenced individual's economic behaviour. For instance, usury is forbidden in some religions. The payment or charging of interest for loans of money is prohibited in Islam, and followers of Islam may decline to engage in transactions that involve interest. Religion has also historically discouraged the development of life insurance. As Zelizer (1979, p.73) indicates that until the nineteenth century religion provided a strong source of cultural opposition to life insurance in the US and European countries; life insurance was considered as violating the canonical prohibition of usury. Such a general conception of life insurance may still be found in Muslim countries.

Therefore, we hypothesise a negative relationship between life insurance, and Islam being the dominant religion in a country. However, regarding other religions than Islam we have no prior assumptions about the expected sign.

Wasow (1986), Browne and Kim (1993), Outreville (1996), Ward and Zurbruegg (2002), and Beck and Webb (2003), report that life insurance consumption is negatively related with countries, whereby the dominant religion is Islam.

4.2.7. Supply of life insurance

The supply of life insurance is hypothesised to be a function of the price of life insurance and return on underwriting capital investment (See Beenstock, Dickinson and Khajuria, 1988; and Outreville 1996). That is, $S = S(\mu, r)$ where S, μ, and denote supply, premiums rate, and interest rates, respectively. The price may include the expected claims, fixed and variable costs and a profit margin. It is hypothesised that the cost of insurance supply (C) is a function of infrastructural development (Tel), financial development (FD) and institutional quality (InsQ) in a country. That is, $C = C\,(\,InsQ, FD, Tel\,)$. This assumption indicates that the cost of insurance supply will depend on institutional quality, financial and infrastructural development in a country. The higher the degree of development the lower the costs incurred to provide life insurance services. Following Outreville (1996) life expectancy is hypothesised to reflect the actuarially fair price. [102] Hence, the supply of life insurance may be written as follows: $S = S\,(\,InsQ, FD, Tel, Lifex, r\,)$. Below we describe financial development. For description of institutional quality, and physical infrastructural development (see sections 3.3.3.2 and 3.3.3.3, respectively).

4.2.7.1. Financial Development

Financial development is likely to promote life insurance development and credit consumption alike. The primary goal of a financial system (financial markets and financial institutions) is to facilitate payment services (transaction) and flow of funds

[102] Outreville (1996), states that "(a) *long life span decreases the price for insurance but also leads to greater incentives for human capital accumulation. Therefore, longer life expectancy is expected to have a substantial positive effect on the demand for life insurance*"p.267.
Note that life expectancy is also used as a proxy for the probability of death in the empirical literature. As the demand for life insurance is positively related to the probability of death, life expectancy is hypothesised to be negatively related to the demand for life insurance; such an approach was adopted by Beenstock, Dickinson and Khajuria (1986) Browne and Kim (1993), and Li, et al (2007).

from lenders (savers) to borrowers (investors or spenders), Barth and Brumbaugh (1997, p.2). According to the authors a well developed financial system provides both an efficient credit system to transfer funds between lenders and borrowers and efficient payment system to facilitate transactions. A financial system is efficient, when prices reflect risk, and demand and supply determine the allocation of funds among potential borrowers (investors/entrepreneur/consumers) at low transactions costs, Barth and Brumbaugh (1997, p.5).

Financial markets development is likely to have positive impacts on life insurance activities. Life insurance companies provide not only insurance coverage but they are also engaged in long term investment in the financial market. For instance, in 2008, the total European insurers' investment portfolio was estimated at €6 900bn, of which life insurance industry accounted for more than 80%, CEA (2009, p.20). During the period 1996-2007 debt securities and other fixed income securities, and shares and other variable-yield securities and units in unit trusts accounted for about two thirds of European insurers' investment portfolio; and the remaining was mainly invested as loans, CEA (2009, p.21).

4.3. Economic Model and Empirical Strategy

4.3.1. The Economic Model

Suppose that a consumer is considering a one period planning horizon of t_1 at current time t_0, i.e., from time t_0 to time t_1, where t_1 is the planning period, with $t_1>0$. At the end of the planning period the consumer is either dead or alive. Consumer's probability of death is given by π, and the probability of survival is $1-\pi$. The consumer has no assets and without bequest motives. Let y denote the present value of consumer's future labour income. The consumer wants to borrow against his/her future labour income. At time t_0, the consumer can do so by purchasing life coverage as collateral. Let I denote insurance coverage and μ the rate of insurance premium, where μ is between zero and one, and P the insurance premiums is P=μI. At time t_1 if the consumer is dead the lender/investor obtains life coverage. However, if the borrower is alive the lender does not get insurance benefit.

At time t_0 the consumer maximizes the expected utility of her real wealth with respect to life insurance coverage or face value I. Assume that the consumer has a Von Neumann-Morgenstern (VNM) utility function G with G′>0 and G″<0. Assume also the provision of credit life insurance is costly. That is, there is imperfect information and transaction cost, i.e., μ>π to take into account insurance loading. Since inflation in a modern economy is inevitable, the model needs to include such a factor. Inflation rate, x, is incorporated into the model as a factor that affects consumer income in cases of death or survival. Inflation is assumed to be known.

Then, we can write consumer's insurance decision as maximizing the expected utility of her income as follows:

$$\underset{I}{Max}\, EU = \{\pi\, G(K_d) + (1-\pi)G(K_l)\} \tag{4.1}$$

where $K_d = (I + ((c-y) - \mu I)((1+r)/(x)))$, and $K_1 = (y + ((c-y) - \mu I))(1+r)/(x))$, K_d and K_l are income levels, and subscripts d and l denote death and alive, respectively. Credit is composed of consumption $\frac{(c-y)(1+r)}{x}$ and premiums $\frac{\mu I(1+r)}{x}$. c denotes the present value of consumption, and r is interest rate to be paid at the end of the period and assumed to be known.

In order to derive the demand function for life insurance we may utilize the following power utility function:

$$G(K) = -K^{-\gamma} \tag{4.2}$$

where $\gamma > 0$. Of course other utility functions may also be used and this one here is chosen as it implies constant relative risk aversion. It also implies income elasticity greater than unity, which is in line with the empirical result in this chapter. After employing the utility function (4.2), differentiating and rearranging, we have:

$$I = \frac{B\frac{y}{x} + \frac{c-y}{x}(1+r)(B-1)}{\frac{\mu}{x}(1+r)(B-1) + \frac{1}{x}} \tag{4.3}$$

where $B = \left[\frac{(\frac{1}{x} - \frac{\mu}{x}(1+r))\gamma\pi}{\frac{\mu}{x}(1+r)(1-\pi)\gamma)} \right]^{\frac{1}{\gamma+1}}$

Therefore, the demand for insurance will depend on the level of Credit/borrowing (C), inflation, the probability of the death, income, risk aversion, interest rates, and the loading (e.g. administrative costs in excess of the expected loss). More generally, equation (4.3) may be written as follows:

$$I = f(y, C, \gamma, r, \pi, \mu, Inf) \tag{4.4}$$

The derived demand function in equation (4.4) needs to incorporate informal credit from informal institutions (InfFins), and religion (b). Therefore, equation (4.4) may be modified to include these variables as follows:

$$I = f(y, b, C, \gamma, r, \pi, \mu, Inf, InfFins) \tag{4.5}$$

The expected partial derivatives of equation (4.5) are as follows: $\partial I/\partial y>0$; $\partial I/\partial b><0$ $\partial I/\partial C>0$;$\partial I/\partial \gamma>0$;$\partial I/\partial r><0$;$\partial I/\partial \pi>0$;$\partial I/\partial InfFins<0$; $\partial I/\partial Inf>0$.

The partial derivative with respect to income (y) is hypothesized to be positive. The empirical result in the present chapter supports the hypothesis of a positive income effect. The partial derivative with respect to borrowing/credit (C) is also predicted to be positive.

The predicted sign of the partial derivative with respect to risk aversion (γ), the probability of death (π), and amount of loss is positive. Karni and Zilcha (1986) analyzed the implications of differences in risk aversion for the optimal choice of life insurance for a consumer under uncertain lifetime and without bequest motive. They suggest a positive relationship between individual's degree of risk aversion and the purchase of life insurance coverage. Mossin (1968) shows that agent's willingness to pay for insurance coverage increases with the probability of, and size of the loss. Schlesinger (1981) shows that an individual with higher probability of loss will purchase more insurance coverage.

The expected partial derivative with respect to the price (loading) of insurance is negative.

The partial derivative with respect to inflation (Inf) is expected to be positive.

The partial derivative with respect to informal credit (InfFins) is hypothesised to be negative. Since informal lenders use collateral substitutes they can be considered as substitutive for insurance and hence the partial derivative is negative. The empirical result in this study is in line with the hypothesized sign.

The partial derivative with respect to Islamic religion (b) is expected to be negative. Although we do not make any presumption about other religions, it is likely that some religions may promote credit consumption/life insurance consumption, while others may discourage it.

As in Beenstock, Dickinson, and Khajuria (1986) and Outreville (1996) we assume that in equilibrium the quantity of life protection supplied is equal to the quantity demanded, i.e., S=I=V where V represents the total life insurance protection, and S and I are the supply and demand functions, respectively, i.e.,

$$S = S(InsQ, FD, Tel, Lifex, r).$$

$$I = f(y, b, C, \gamma, r, \pi, \mu, Inf, InfFins)$$

As life premium income is equal to the total life insurance protection V multiplied by the per unit price of life insurance coverage μ, then life premium income P= $\mu * V = f(y, b, C, \gamma, r, Lifex, Inf, InsQ, FD, Tel, InfFins)$

The predicted signs of the partial derivatives with respect to infrastructural development (Tel), financial development (FD) and institutional quality (InsQ) are expected to be positive. That is, ∂P/∂InsQ>0;∂P/∂FD>0;∂P/∂tel>0.

Table 4-1 presents a summary of hypothesised signs of all explanatory variables and proxies used.

4.3.2. Empirical Strategy

The estimation and statistical tests will be based on the Common Correlated Effects Pooled (CCEP) method advanced by Pesaran (2006). We will estimate the following specification:

$$P_{it} = \alpha_i + \beta_i' X_{it} + \varepsilon_{it} \tag{4.6}$$

$$\varepsilon_{it} = \rho_i f_t + e_{it} \tag{4.7}$$

i=1,...,N;t=1,...T,

where P_{it} denotes life insurance density/life insurance penetration in the i^{th} country at time t, and is the dependent variable and X_{it} is a vector of explanatory variables that include GDP per capita, institutional indicator, financial development indicator, infrastructural development indicator (telephone mainline per 100 people), life expectancy, risk aversion indicator (education level), informal credit indicator (agriculture value added as a share of GDP), and α_i is a country specific intercept, and β is a vector of coefficients, and ε_{it} is the error term.

In order to account for possible cross-section dependence in equation (4.6) we assume that the errors have the multifactor structure as given in equation (4.7), where f_t is the b×1 vector of unobserved common effects and e_{it} is a country specific error assumed to be independently distributed.

Pesaran (2006) suggests that unobserved factor can be approximated by the cross section averages of the dependent and independent variables. Therefore, we will estimate the following equation after incorporating the unobserved factor

$$P_{it} = \alpha_i + \beta_i' X_{it} + h_i' \overline{W}_t + e_{it} \tag{4.8}$$

where $\overline{W}_t = (\ln \overline{P}_t, \overline{X}_{it})'$, and $\ln \overline{P}_t$,and $\overline{X}_{it}$ are cross section averages of the dependent and independent variables respectively.

As an alternative to the error term form (4.7) we employ the following Spatial Autoregressive process:

$$\varepsilon_{it} = \rho \Omega \varepsilon_{it} + e_{it} \tag{4.9}$$

We have adopted weights based on the inverse of the distance between capital cities expressed in latitude/longitude points and are represented by spatial weights matrix (Ω) with dimension N × N. Maximum Likelihood estimation method is used to estimate (4.6) with the form of spatial correlated errors (4.9).

In order to investigate cross section correlation in the data we use the average pairwise correlation coefficient, the Pesaran (2007) CD_ρ test and the CD_{LM} test suggested by Frees (1995), (for details see appendix B). We also test for the presence of spatial dependence using Moran's I test (for details see chapter 2 in this thesis).

4.4. Data Measures, Sources and Statistics

In this chapter we use life insurance density (premiums divided by population) and life insurance penetration (premiums divided by GDP) as a measure of life insurance development. Data on insurance premiums (premiums /GDP) is obtained from Beck, Demirguc-Kunt, & Levine (2000).

As an indicator of income we use GDP per capita. Annual data on GDP per capita, at constant 2000 US dollars is from World Development Indicators (WDI).

As a measure of private credit we use the sum of claims on the private sector by deposit money banks (IMF's International Financial Statistics (IFS) line 22d) plus, depending on availability, claims on the private sector by other financial institutions (IFS line 42d). Since credit is a stock variable measured at the end of a period to be compared with flow variables like insurance expenditures, and income, real credit per capita, following Beck, Demirguc-Kunt and Levine (2000), is computed as the average of two contiguous end-of-year observations of nominal credit per capita multiplied by a US Dollar conversion factor and deflated by the corresponding end-of year USA consumer price indices (IFS line 64), i.e. the value of December. That is:

$$RPCpc_t = \frac{0.5\left|\dfrac{PC_t^i * US\$\,\text{Exchange Rate}_{\text{t}}^{\text{i}}}{\text{CPI}_{\text{e,t}}^{\text{US}}} + \dfrac{PC_{t-1}^i * US\$\text{Exchange Rate}_{\text{t-1}}^{\text{i}}}{\text{CPI}_{\text{e, t-1}}^{\text{US}}}\right|}{\text{Population}_{\text{t}}}$$

for t≥2

where RPCpc_t is real private credit per capita at time t in country i and e denotes the end-of-period.

As a proxy for the actuarially fair price we use life expectancy. Data on life expectancy is from World Development Indicators (WDI) and U.S. Census Bureau, Population Division.

We use fixed telephone mainlines subscribers (per 100 people) as a proxy for infrastructural development in a country. Data on telephone mainlines per 100 people is from WDI.

As a measure of institutional quality, this chapter utilizes Polity' institutionalized democracy, autocracy, and polity2 indicators published by The Centre for Systemic Peace's Polity IV project, (for description see section 3.5).

There is no consensus on a measure of financial development. As a measure of financial development, Outreville (1990) used the ratio of M2 (broad money) to GDP alternative the ratio of currency and demand deposit MI to M2. However, a broader measure of the level of financial depth, i.e. the overall size of the financial system in a country is the ratio of liquid liability to GDP, Beck, Demirgüç-Kunt and Levine (2000). The authors indicate that liquid liability comprises currency held outside of the banking system plus demand and interest-bearing liabilities of banks and other financial intermediaries. Therefore, in this chapter we use liquid liability as an indicator of financial development. Data on liquid liability expressed as a percentage of GDP obtained from WDI, and Beck, Demirgüç-Kunt and Levine, (2000).

As a measure of real interest rate we use real average lending interest rate. Annual data on real interest rates is from the WDI.

As a measure of anticipated inflation existing empirical work on life insurance tend to use a weighted average of inflation over prior years, (see Browne and Kim, 1993; Outreville, 1996; Beck and Webb, 2003; and Li et al, 2007). However, such a proxy may be subjected to heuristic errors, therefore, in the present chapter, we use lag value of inflation rate as a measure of anticipated inflation. Annual data on inflation consumer price index is from the WDI.

As a measure of religion followers in a country, Wasow (1986), Browne and Kim (1993), and Ward and Zurbruegg (2002) used a dummy variable for Muslim countries. Outreville (1996) used the percentage of Muslim population. Beck and Webb (2003) used the ratio of adherents of a religion to the entire population for testing the effects of different component of religions. Similar to Beck and Webb (2003) we also use the percentage of religion followers in a country. Data on religion is from the World Factbook.

Empirical work on the demand for life insurance often use education to proxy for risk aversion, (see Browne and Kim, 1993; Outreville, 1996; Ward and Zurbruegg, 2002; Beck and Webb, 2003; and Li et al, 2007). Following this literature, in this chapter, we also use the gross enrolment ratio of secondary education as well as the gross enrolment of tertiary education to proxy degree of risk aversion. Data on educational secondary and tertiary gross enrolment ratios are all from WDI and United Nations Educational, Scientific and Cultural Organization (UNESCO) Annual Statistics.

As a proxy for the use of informal credit mechanisms/ institutions we use the share of agriculture in a country's GDP. Agricultural societies are likely to use informal credit institutions. Agricultural sector includes forestry, hunting, fishing, cultivation of crops and livestock production. Data on agriculture value added are from WDI and United Nations Statistics Division.

In this chapter we utilize two data sets. A full dataset1 includes 98 industrialized and developing economies over the period 1960-2009 to investigate the long run relationship between life insurance services and private credit consumption. A limitation of the data is that it is unbalanced and there are gaps. Indeed, this limits conducting factor and spatial diagnostic tests that require balanced data. In order to conduct such diagnostic tests we use a dataset2 that includes, out of the full dataset, 56 developed and emerging economies over the period 1993-2008. Choice of countries and time interval were based on availability of observations for all (or most) variables, and remaining gaps were filled using values of a relevant related variable, if not available an average value of the variable for adjacent years.[103] List of countries are in the tables of summary statistics.

Datasets 1 and 2 are summarized in Tables 4-1A, and 4-1C, respectively. These tables provide the definition and source of all key variables, units of measurement, means, standard deviations (overall, between and within countries), and minimum and maximum values. The summary statistics show that there is variation between and within countries, justifying the use of panel estimation methods.

Moreover, Tables 4-1B, and 4-1D provide the correlation coefficients between all variables for datasets 1 and 2 respectively. The dependent variable is life insurance consumption per capita, or life insurance penetration. The correlation coefficients between the dependent and independent variables are statically significant at least at 5 percent level of significance. The signs of the coefficients with the exception of real interest rate, and institutional quality indicator autocracy, are consistent with theoretical predications.

[103] For interest rate we used real lending interest rates. Gaps were filled used Treasury bill rates. If this is not available (the case of Portugal and Austria) the gap is filled by government bond yields. For inflation rates we used consumer price index and gaps were filled by GDP deflator inflation. We used lagged inflation rates with the exception for 1993 for which we used its annual value.

4.5. Diagnostic Tests and Estimation Results

4.5.1. Results of Cross Section Dependence Tests

In order to investigate cross section dependence in the data we have utilized Cross section Dependence Lagrange Multiplier (CD_{LM}) test suggested by Frees (1995) and Pesaran Cross section Dependence (CD_{ρ}) test.

As the dataset1 is unbalanced, it was not possible to conduct the test for all variables. Therefore, we have utilized the balanced dataset2 of 56 developed and emerging economies over the period 1993-2008.

Table 4-2 displays the average correlation coefficient of variables expressed in the first difference and regressed on a country specific intercept. Average correlation coefficients vary across variables, for instance 0.227 in agriculture value added, 0.379 in telephones mainlines, 0.229 in life penetration, and 0.231 in life density. The results suggest that the presence of cross-section correlation between pairs of countries for life insurance density, life insurance penetration, GDP per capita, private credit consumption, telephone mainlines, agriculture value added, education indicators, life expectancy and liquid liability. For institutional quality indicators, namely autocracy, democracy and polity2 the test does not provide results. Both Pesaran CD_{ρ} test and CD_{LM} reject the null hypothesis of cross section independence.

By the same token, the Moran's I test rejects the null hypothesis of global spatial cross section independence. The Moran's I test is computed for variables in levels.[104]

[104] The test did not provide results for the variables in the first difference.

It also indicates the presence of spatial cross section dependence in all variables but not agriculture value added and inflation.

4.5.2. Nonstationarity Test Results

We conducted two diagnostic tests for the presence of unit root in panel dataset1, namely Fisher-type unit root test for panel, the Maddala-Wu-Phillips-Perron (PP) test and Pesaran (2007) unit root test for heterogeneous panel data (CIPS). While the former test assumes cross section dependence in the data, the latter test accounts for possible cross-section dependence in the data. Therefore the analysis is based on CIPS test results, and the Maddala-Wu test is reported for comparison.

The results of Phillips-Perron unit root test are presented in Table 4-3. It shows that, liquid liability, GDP per capita, life density, life penetration, and private credit are nonstationary in levels and stationary in first difference. In contrast, interest rates, and inflation are stationary. For other variables the data is the same data set used in chapter 3 and results of unit root test are in Table 3-3.

Table 4-4 reports the results of the CIPS test. The test results show that liquid liability, GDP per capita, life density, life penetration and private credit consumption per capita are nonstationary in levels and stationary in the first difference. By contrast, inflation and interest rates are stationary. For other variables the data set is the same used in chapter 3 and results of the CIPS test are in Table 3-4.

All in all, the results of the test suggest nonstationarity of the dependent variable and several explanatory variables in levels and stationarity of all variables in the first difference. This may suggest the need to investigate whether life insurance and private credit cointegrate or not.

4.5.3. Cointegration Analysis

The possibility of cointegration between life insurance development indicators and private credit consumption is investigated using the Pedroni (2004) test and the $CADFC_p$ advanced by Banerjee and Carrion-i-Silvestre (2011). Unlike the latter test, the Pedroni test assumes cross section independence in the data. Therefore, the Pedroni test is applied on demeaned, detrended, detrended and demeaned data. In contrast the $CADFC_p$ test is applied to original data. Moreover, prior to the cointegration test we conducted individual unit root test on the data using Phillips-Perron (PP) test. Based of the PP individual results we obtained a sample of 50 countries whereas life density, life penetration and private credit per capita are nonstationary. Summary of the CIPS panel unit root test results are in Table 4-5. It shows that most variables are nonstationary in levels and stationary in the first difference. Inflation is stationary when the test includes a constant only, and nonstationary with constant and trend.

Summary of cointegration tests results are in Table 4-6. It shows that a log run equilibrium relation is to be expected between life density, life penetration and private credit consumption including other determinants of life insurance development. Estimation and discussion of the long run coefficients are in Section 4.5.6.

4.5.4. Error Correction Model

As we have established the long-run relationship between the indicators of life insurance and private credit consumption, we now turn to the estimation of the following error correction model:

$$\Delta P_{it} = \alpha_i + \phi_i (P_{i,t-1} - \hat{\beta} X_{t,t-1}) + \sum_{j=1}^{p} \varphi_{ij} \Delta P_{i,t-j} + \sum_{j=1}^{p} \gamma_{ij} \Delta X_{i,t-j} + \varepsilon_{it} \quad (4.10)$$

where Δ denotes the first difference operator, in the parenthesis we have the previous period's error term. The coefficient ϕ_i measures the speed of adjustment of life insurance penetration/density to a deviation from the long-run equilibrium relation between life insurance consumption and its determinants. We estimated the model using the sample of 50 countries over the period 1960-2009 as well as the CCEP method. In estimating equation (4.10) unobserved factors were approximated by $\Delta \overline{P}_t, \Delta \overline{P}_{t-1}, \Delta \overline{\mathrm{X}}_{\mathrm{t\text{-}1}}$ and $\overline{\mathrm{P}}_{t-1} - \hat{\beta} \overline{X}_{t-1}$, where $\hat{\beta}$ are the estimated coefficients in all regressions.

Estimation results are displayed in Table 4-6B. Estimation results show that the error correction term is significant and has the expected negative sign in both specifications. When life density is the dependent variable GDP per capita and life density in prior period are important towards the dynamic adjustment. By contrast, when life penetration is the dependent variable life penetration in prior period is significant in the dynamic adjustment. The results suggests that private credit has no impact on the dynamic adjustment, i.e., in the short run.

4.5.5. Granger Causality Test

In order to investigate the causal relationship between private credit consumption expansion and life insurance development we use error correction model of life insurance development, and private credit consumption, as suggested by Granger (1988). He argued that in the presence of cointegrating relationship between a pair of I (1) series the equilibrium error should be taken into account when testing for causality to avoid possible model misspecification. Therefore, we estimate the following simultaneous equations:

$$\Delta P_{it} = \alpha_i + \phi_i (P_{i,t-1} - \hat{\beta} X_{t,t-1}) + \sum_{j=1}^{p} \varphi_{ij} \Delta P_{i,t-j} + \sum_{j=1}^{p} \gamma_{ij} \Delta X_{i,t-j} + \varepsilon_{it} \tag{4.11}$$

$$\Delta PC_{it} = \alpha_i + \phi_i (PC_{i,t-1} - \hat{\beta} X_{t,t-1}) + \sum_{j=1}^{p} \varphi_{ij} \Delta PC_{i,t-j} + \sum_{j=1}^{p} \gamma_{ij} \Delta X_{i,t-j} + \varepsilon_{it} \tag{4.12}$$

where equation (4.11) is the same as equation (4.10). In equation 4.12 Δ denotes the first difference operator, PC denotes private credit, in the parenthesis we have the previous period's error term. The coefficient ϕ_i measures the speed of adjustment of private credit to a deviation from the long-run equilibrium relation between private credit consumption and its determinants.

We estimated the model using the CCEP method and the dataset of 50 countries over the period 1960-2009. In estimating equation (4.12) unobserved factors were approximated by $\Delta \overline{PC}_t, \Delta \overline{PC}_{t-1}, \Delta \overline{\mathrm{X}}_{\mathrm{t-1}}$, where $\hat{\beta}$ are the estimated coefficients in all regressions.

Table 4.6C presents the results from the Granger causality tests using the CCEP method and 4 lags. The test for Granger causality between life insurance development and private credit consumption was carried using four specifications. On the one hand, the test involves examining the causality direction between life penetration and private credit consumption. On the other, the test involves examining the causality direction between life density and private credit consumption. As shown in Table 4.10 the results show that in all specifications the coefficient of the cointegrating vector is statistically significant, which suggests that causality between life insurance development and private credit consumption in the long run exists. The results suggest that in all specifications there is a long bi-directional causality relationship between life density and private credit consumption; life penetration and private credit consumption.

4.5.6. Estimation Results and Analysis

Results of the Fixed Effects and the CCEP Estimator

Estimation results of the fixed effects are in Tables 4-7A. It is for comparison purposes. Results show that both life penetration and life insurance density are positively related to GDP per capita, credit consumption per capita, life expectancy, infrastructural development (telephone mainlines), inflation, and institutional quality indicators (democracy, and polity2); and negatively related to institutional quality indicator autocracy, and informal credit (agriculture value added).

However, as the fixed effects is biased in the presence of cross section dependence, the discussion will focus on the CCEP estimation results displayed in Table 4-7B. While estimation results 13-18 utilize life density as the dependent variable, results 19-24 utilize life penetration as the dependent variable. As the results of life penetration specifications, with the exception of GDP per capita, are in line with life density specifications results, the following analysis is based on results of the latter.

In all specifications, GDP per capita has positive and significant impact on life density. The size of the coefficient of 1.182, (see results 16 in Table 4-7B) indicates that income elasticity is greater than unity. That is, a 1 percent increase in GDP per capita generates an increase in life insurance consumption by 1.18 percent. The result is in line with the findings in the context of life insurance consumption driven by the bequest motive (see chapter 3 in this thesis). However, the coefficient in the present case is much lower than the corresponding coefficient of 1.778 in the case of life density coverage for bequest (see also chapter 3 for comparison with other work).

Private credit consumption per capita has also positive and significant impact on life insurance. The size of the coefficient of 0.178 shows that credit elasticity with respect to life insurance is less than unity. A 1 percent increase in credit consumption generates an increase in life insurance consumption by 0.178 percent. It indicates that credit is a necessity commodity/service, e.g., to smooth consumption.

As might be expected an improvement in life expectancy has an important positive effect on life insurance consumption. The result is consistent with the findings of Beenstock, Dickinson & Khajuria (1986), Outreville (1996) and Ward and Zurbruegg (2002). The size of the coefficient of 0.0156 suggests that a 1 year increase in life expectancy generates an increase in life insurance consumption by 1.56 percent. The magnitude of 1.56 percent increase in life insurance demand associated with a one year increase in life expectancy is much lower than the reported magnitude of 9 percent by Outreville (1996) and 6 percent by Ward and Zurbruegg (2002) in the Asia sample. A plausible explanation for the discrepancy is that the two studies use relatively small sample of countries and simple OLS does not account for omitted variables or unobserved common factors.

Informal credit institutions have negative and significant impact on life insurance consumption. The coefficient of -0.0163 suggests that a 1 percent decrease in the ratio of agriculture value added to GDP generates an increase in life insurance consumption by 1.63 percent. That is, informal credit functions as substitute for formal life insurance services.

Infrastructural development has also important and positive impact on life insurance demand. The coefficient of 0.0224 indicates that an increase by a telephone mainline (per 100 people) generates an increase in life insurance consumption by 2.24 percent. The increase in demand may be explained by a low price/cost of insurance due to infrastructural development.

Inflation or anticipated inflation has positive and significant impact on life insurance consumption. The coefficient of 0.000645 indicates that an increase of 1 percent inflation rate generates an increase in life insurance consumption by 0.0645 percent. The results support the inflation hypothesis that consumers tend to borrow more during inflation.

Institutional quality indicators democracy and polity2 have positive and significant impact on life insurance consumption. Nevertheless, the impact of democracy of 0.0165 is greater than the impact of polity2 of 0.00927 on life insurance consumption. This may be explained by the finding that autocracy has no impact on life insurance, and polity2 is a combined measure of both democracy and autocracy institutional indicators. In general, an environment with high institutional quality is likely to be associated with low transaction cost (price) of insurance services, which in turn enhances the demand for insurance.

Results of the Spatial Maximum Likelihood Estimator

Estimation results of spatial maximum likelihood estimator (MLE) are presented in Table 4-7C. Estimation results of life penetration are 1-6, and for life insurance density are 7-12. Both dependent variables are positively related to private credit consumption per capita, liquid liability, democracy; polity2, inflation, telephone mainlines and secondary schooling; and negatively related to agricultural value added, life expectancy and autocracy. Interestingly, similar specifications in life penetration and life density models have identical coefficients, and the elasticity of credit consumption is below unity. However, life penetration is negatively related to GDP per capita suggesting that life penetration is an inferior commodity. By contrast, life density is positively related to GDP per capita with an elasticity of less than unity indicating that life insurance is a necessity commodity. The spatial autoregressive parameter is also statistically significant. In all specifications real interest rates and tertiary education are insignificant. The spatial MLE results differ from the CCEP results most likely for using different data sets and the two estimators also account for different types of cross section dependence. The spatial MLE estimator accounts for spatial dependency and the results are for the balanced dataset2 of 56 developed and emerging economies over the period 1993-2008.

OLS Results

Table 4-7D displays ordinary least square (OLS) regression results.[105] The OLS is used as religion variable is almost time invariant. It shows that life insurance consumption is less in countries where the dominant religions are Orthodox and Islam. Both life density and life penetration are positively related to credit consumption per capita, and infrastructural development; and negatively related to agriculture value added, life expectancy, Orthodox and Islam being the dominant religions in a country. Life penetration is positively related to financial development (liquid liability) and negatively related to GDP per capita. Other variables are statistically insignificant. Note that some of the OLS results diverge from those of

[105] In the OLS regression all variables, with the exception of religion and legal origin, were averaged over the period 1989-2009. Note that Wasow (1986), and Browne and Kim (1993), and Ward and Zurbruegg (2002) use a dummy variable for Muslim countries, Outreville (1996) use the percentage of Muslim population. Beck and Webb (2003) use the ratio of adherents of a religion to the entire population for testing the effects of different component of religions. We used the percentage of each religion followers in a country, and legal origin dummies, as well as an average of 1989-2009 for all variables.

the panel estimation results. For instance, in the OLS results, life insurance is negatively related to life expectancy. A plausible explanation is that the results are based on different datasets and simple OLS does not account for omitted variables.

All in all, the results show that, life insurance development may be explained by GDP per capita, credit consumption per capita, institutional quality, informal credit institutions, infrastructural development, life expectancy, and anticipated inflation.[106] Life insurance consumption is less in countries where the dominant religions are Orthodox and Islam than others.

[106] We also experimented with other control variables including mortality risk indicators (young dependency ratio), longevity risk indicator (old dependency ratio), social security and welfare, and saving (gross saving). The CCEP estimation results in Table 4-9 show that credit consumption per capita, GDP per capita, infrastructural development indicator (tel), longevity risk indicator(agdo) social security and welfare, are statistically significant and have positive sign. By contrast, informal institutions indicator (agva) and anticipated inflation are statistically (weakly) significant with negative sign. Other variables were statistically insignificant.

4.6. Conclusions

The aim of this chapter was to examine the role of private credit in the development of life insurance. We have investigated the long run economic relationship between life insurance premiums and private credit consumption using a panel techniques and a data set of 98 countries over the period 1960-2009.

We conducted two diagnostic tests for the presence of unit root in the data, namely Fisher-type unit root test for panel, the Phillips-Perron (PP) test and Pesaran (2007) unit root test for heterogeneous panel data (CIPS). Results of the tests suggest nonstationarity of variables in levels and stationarity in the first difference.

Estimation results suggest that life insurance development is positively related to GDP per capita, institutional quality, infrastructural development, formal private credit consumption per capita, life expectancy and inflation, and negatively related to informal credit and Islam and Orthodox being the dominant religions in a country.

The possibility of cointegration between life insurance premiums and private credit consumption are investigated using the Pedroni (2004) test and the $CADFC_p$ advanced by Banerjee and Carrion-i-Silvestre (2011). The results show that life density/life penetration and credit consumption exhibit a long run relationship. We also investigated the dynamic adjustment of life insurance and private credit consumption using an error correction model. Estimation results suggest that the error correction term is significant and has a negative sign. Private credit has no significant impact on the dynamic adjustment.

We have also tested for Granger causality between life insurance development and private credit consumption. The results suggest that there is a long bi-directional causality relationship between life density and private credit consumption, life penetration and private credit consumption.

Appendix F

Solution of the demand for credit life insurance

$$\underset{I}{Max}\, EU = \{\pi U(K_d) + (1-\pi)U(K_l)\}$$

$$K_d = (\frac{I}{x} + (\frac{c-y}{x} - \frac{\mu I}{x})(1+r)) \text{ and } K_l = (\frac{y}{x} + (-\frac{c-y}{x} - \frac{\mu I}{x})(1+r)$$

$$U(K) = -K^{-\gamma}$$

$$\underset{I}{Max}\, EU = \left\{\pi(-(\frac{I}{x} + (\frac{c-y}{x} - \frac{\mu I}{x})(1+r))^{-\gamma} + (1-\pi)(-(\frac{y}{x} + (-\frac{c-y}{x} - \frac{\mu I}{x})(1+r)^{-\gamma}\right\}$$

$$\frac{dE(U)}{dI} = 0$$

$$(\frac{1}{x} - \frac{\mu}{x}(1+r))\gamma\pi((\frac{I}{x} + (\frac{c-y}{x} - \frac{\mu I}{x})(1+r))^{-\gamma-1}$$
$$-\frac{\mu}{x}(1+r)(1-\pi)\gamma(\frac{y}{x} + (\frac{c-y}{x} - \frac{\mu I}{x})(1+r))^{-\gamma-1}) = 0$$

$$(\frac{1}{x} - \frac{\mu}{x}(1+r))\gamma\pi((\frac{I}{x} + (\frac{c-y}{x} - \frac{\mu I}{x})(1+r))^{-\gamma-1}$$
$$= \frac{\mu}{x}(1+r)(1-\pi)\gamma(\frac{y}{x} + (\frac{c-y}{x} - \frac{\mu I}{x})(1+r))^{-\gamma-1})$$

$$\frac{(\frac{1}{x} - \frac{\mu}{x}(1+r))\gamma\pi}{((\frac{I}{x} + (\frac{c-y}{x} - \frac{\mu I}{x})(1+r))^{\gamma+1}} = \frac{\frac{\mu}{x}(1+r)(1-\pi)\gamma}{(\frac{y}{x} + (\frac{c-y}{x} - \frac{\mu I}{x})(1+r))^{\gamma+1}}$$

$$\frac{(\frac{1}{x} - \frac{\mu}{x}(1+r))\gamma\pi}{\frac{\mu}{x}(1+r)(1-\pi)\gamma} = \left[\frac{(\frac{I}{x} + (\frac{c-y}{x} - \frac{\mu I}{x})(1+r))}{(\frac{y}{x} + (\frac{c-y}{x} - \frac{\mu I}{x})(1+r))}\right]^{\gamma+1}$$

$$\left[\frac{(\frac{1}{x} - \frac{\mu}{x}(1+r))\gamma\pi}{\frac{\mu}{x}(1+r)(1-\pi)\gamma}\right]^{\frac{1}{1+\gamma}} = \left[\frac{\frac{I}{x} + (\frac{c-y}{x} - \frac{\mu I}{x})(1+r)}{\frac{y}{x} + (\frac{c-y}{x} - \frac{\mu I}{x})(1+r)}\right]$$

Assume $B = \left[\frac{(\frac{1}{x} - \frac{\mu}{x}(1+r))\gamma\pi}{\frac{\mu}{x}(1+r)(1-\pi)\gamma}\right]^{\frac{1}{1+\gamma}}$ then $B = \frac{\frac{I}{x} + (\frac{c-y}{x} - \frac{\mu I}{x})(1+r)}{\frac{y}{x} + (\frac{c-y}{x} - \frac{\mu I}{x})(1+r)}$

$$B(\frac{y}{x} + (\frac{c-y}{x} - \frac{\mu I}{x})(1+r)) = \frac{I}{x} + (\frac{c-y}{x} - \frac{\mu I}{x})(1+r)$$

$$B(\frac{y}{x} + (\frac{c-y}{x})(1+r)) - B\frac{\mu I}{x})(1+r) = \frac{I}{x} + \frac{c-y}{x}(1+r) - \frac{\mu I}{x}(1+r)$$

$$B(\frac{y}{x} + (\frac{c-y}{x})(1+r)) - \frac{c-y}{x}(1+r) = B\frac{\mu I}{x}(1+r) + \frac{I}{x} - \frac{\mu I}{x}(1+r)$$

$$B\frac{y}{x} + \frac{c-y}{x}(1+r)(B-1) = I(\frac{\mu}{x}(1+r)(B-1) + \frac{1}{x})$$

$$I = \frac{B\frac{y}{x} + \frac{c-y}{x}(1+r)(B-1)}{\frac{\mu}{x}(1+r)(B-1) + \frac{1}{x}}$$

Appendix G

Table 4- 1 Summary of Hypotheses for Life Insurance Development		
Variable/hypotheses	proxies	Expected effect on life insurance development
Income	GDP per capita	positive
Risk aversion	Secondary enrolment ratio/ tertiary enrolment ratio	positive
Physical infrastructural development	Telephone main lines	positive
Fair price of insurance	Life expectancy	positive
Financial development	Liquid liability	positive
Institutional quality	Democracy/Autocracy/Polity2	positive
Anticipated inflation	Lag value of CPI	positive
Informal credit institutions	Agriculture value added	negative
Real interest rates	Average lending interest rate	ambiguous
Private credit	Per capita credit	positive
Muslim (others) country	Percentage of followers	Negative (ambiguous)

Table 4-1 A: Summary Statistics of Dataset of 98 Countries over 1960-2009

Variable	Label	Source	Measure of/Proxy for	Mean	overall Std. Dev.	between Std. Dev.	within Std. Dev.	Min	Max	Observations
premiums/GDP	lifpen	Beck, Demirguc-Kunt, & Levine (2000)	Insurance penetration	0.018134	0.023941	0.018395	0.01442	0.000035	0.272035	N = 2529
(premiums/GDP)*(per capita income (US$ 2000 constant) alternative (Premiums/GDP)*GDP/ Population)	lifden	Beck, Demirguc-Kunt, & Levine (2000), and Swiss Re/WBI	Insurance density	322.039	626.9973	387.4971	444.1499	0.012218	7753.668	N = 2453
GDP and per capita income (US$ 2000 constant)	gdppc	WDI	Income	7826.665	9258.296	8525.051	3989.668	72.32493	59182.83	N = 4211
private credit per capita (real in USD)	pcrpc	(IFS line 22d plus line 42d)	Credit per capita consumption	83.94203	192.6297	116.6509	152.3186	4.56E-13	3983.688	N = 4089
Life expectancy at birth, total (years)	lifex	WDI	Fair price	67.32532	9.034585	7.265758	5.27711	37.87134	82.58756	N = 4546
Liquid liability % of GDP	liql	WDI and Beck, Demirguc-Kunt, & Levine (2000)	Financial development	62.54563	308.4043	82.26459	296.9633	1.866373	11511.3	N = 3938
Gross secondary education enrolment ratio	sches	WDI and UNESCO annual statistics	Risk aversion	68.25656	33.98789	23.62604	24.65226	0.5959	1103	N = 3422
Gross tertiary education enrolment ratio	schet	WDI and UNESCO annual statistics	Risk aversion	23.7759	19.76474	15.0021	13.48576	0	98.09171	N = 3044
Agriculture value added %of GDP (Agriculture, hunting, forestry, fishing)	agva	UN Statistics	Informal risk sharing institutions	12.40533	10.83835	9.003395	5.706728	0.043773	74.23312	N = 4041
Telephone mainlines per (100)	tel	WDI	Infrastructural development	19.34086	18.56824	15.94985	9.436711	0.020773	74.46233	N = 3587
democracy	democ	Polity IV Project, Monty G. Marshall and Keith Jaggers	Institutional quality	5.217249	4.316304	3.666167	2.288519	0	10	N = 4267
autocracy	autoc	Polity IV Project, Monty G. Marshall and Keith Jaggers	Institutional quality	2.790251	3.564136	2.964993	2.016297	0	10	N = 4267
Polity2	polity2	Polity IV Project, Monty G. Marshall and Keith Jaggers	Institutional quality	2.433763	7.652017	6.502283	4.076373	-10	10	N = 4265
Real interest rate (%)	reair	WDI	lending interest rate	5.766899	13.44628	7.005357	12.08861	-91.7244	374.309	N = 2424
Inflation, consumer prices (annual %)	infcp	WDI	Inflation	30.39938	436.5785	91.43642	427.9842	-21.675	24411.03	N = 3865

Countries, N: 98, Algeria, Argentina, Australia, Austria, Bahrain, Bangladesh, Barbados, Belgium, Botswana, Brazil, Bulgaria, Cameroon, Canada, Chile, China Colombia, Costa Rica, Côte d'Ivoire, Croatia, Cyprus, Czech Republic, Denmark, Dominican Republic, Ecuador, Egypt, El Salvador, Estonia, Finland, France, Germany , Greece, Guatemala, Honduras, Hong Kong, Hungary, Iceland, India, Indonesia, Iran, Iraq, Ireland, Israel, Italy, Jamaica, Japan, Jordan, Kazakhstan, Kenya, Korea, Kuwait, Latvia, Lebanon, Libya, Lithuania, Luxembourg, Malaysia, Malta, Mauritius, Mexico, Morocco, Namibia, Netherlands, New Zealand, Nigeria, Norway Oman, Pakistan, Panama, Paraguay, Peru, Philippines, Poland, Portugal, Qatar, Romania, Russian, Saudi Arabia, Singapore, Slovak, Slovenia, South Africa, Spain, Sri Lanka, Sweden, Switzerland, Syrian, Thailand, Trinidad and Tobago, Tunisia, Turkey, Ukraine, United Arab Emirates, United Kingdom, United States, Uruguay, Venezuela, Vietnam and Zimbabwe.

Note that the data for several variables, namely institutional quality indicators, educational indicators, agricultural added value is the same as that used in chapter 3. However, the data for life insurance indicators, GDP per capita, liquid liability, and inflation is an updated version published by the data sources. Therefore some minor differences from the data described in Table3-1A can be observed.

Table 4-1 B: Correlation Matrix for Dataset of 98 Countries over 1960-2009

	lifpen	lifden	gdppc	pcrpc	lifex	liql	sches	schet	agva	tel	democ	autoc	polity2	reair	infcp
lifpen	1														
lifden	0.8407***	1													
gdppc	0.5211***	0.7143***	1												
pcrpc	0.55***	0.7568***	0.6571***	1											
lifex	0.311***	0.4427***	0.616***	0.3787***	1										
liql	0.3628***	0.4918***	0.0602***	0.0647***	0.0945***	1									
sches	0.3635***	0.3602***	0.5207***	0.339***	0.6717***	0.0402**	1								
schet	0.4159***	0.4562***	0.5217***	0.4482***	0.6319***	0.0269	0.6362***	1							
agva	-0.3988***	-0.4156***	-0.5976***	-0.339***	-0.7188***	-0.0707***	-0.5621***	-0.4905***	1						
tel	0.5087***	0.6011***	0.8194***	0.556***	0.7386***	0.0797***	0.6602***	0.7208***	-0.6233***	1					
democ	0.3706***	0.3389***	0.4422***	0.2869***	0.5194***	0.0376**	0.4524***	0.5066***	-0.391***	0.5839***	1				
autoc	-0.3037***	-0.2455***	-0.2587***	-0.1789***	-0.4004***	-0.0307*	-0.3501***	-0.4285***	0.2357*	-0.4195***	-0.8814***	1			
polity2	0.3541***	0.308***	0.371***	0.2466***	0.48***	0.0355**	0.4181***	0.4836***	-0.331***	0.5242***	0.9741***	-0.964***	1		
reair	-0.0795***	-0.0787***	-0.0485**	-0.0394*	0.0508**	-0.034	0.0063	-0.0128	-0.0324	-0.0256	0.068***	-0.0754***	0.0734***	1	
infcp	-0.0738***	-0.0612***	-0.0569***	-0.0403**	-0.0532***	-0.0099	-0.0178	-0.0038	0.0161	-0.0445**	-0.0167	-0.0012	-0.0091	-0.2106***	1

***','**', and'*' indicate significance at 1%, 5% and 10% respectively.

Table 4-1 C: Summary Statistics for Balanced Dataset for 56 Countries over 1993-2008

Variable	Label	Source	Measure of/Proxy for	Mean	Std. Dev.	between St. Dev	Within St. Dev.	Min	Max	Observations
premiums/GDP	lifpen	Beck, Demirguc-Kunt, & Levine (2000)	insurance penetration	0.025477	0.031003	0.029484	0.010319	0.000055	0.228237	N = 896
(premiums/GDP)*(GDP pc (US$ 2000 constant) or (Premiums/GDP)*GDP/Population)	lifden	Beck, Demirguc-Kunt, & Levine (2000), and Swiss Re/WBI	Insurance density	485.2143	829.4326	771.9903	319.3394	0.036251	7041.407	N = 896
GDP pc (US$ 2000 constant)	gdppc	WDI	Income	10929.46	10392.64	10351.92	1624.996	335.9181	40707	N = 896
private credit per capita (real in USD)	pcrpc	(IFS line 22d plus line 42d)	credit per capita consumption	149.0068	218.3179	200.7152	89.72909	0.049413	1186.646	N = 896
Life expectancy at birth, total (years)	lifex	WDI	Fair price	73.20562	6.817154	6.727616	1.404044	44.52373	82.58756	N = 896
Liquid liability % of GDP	liql	WDI and Beck, Demirguc-Kunt, & Levine (2000)	Financial development	67.44811	40.40711	39.13065	11.27782	11.48738	243.8445	N = 896
Gross secondary education enrolment ratio	sches	WDI and UNESCO annual statistics	Risk aversion	87.58562	26.31836	25.07183	8.63681	23.8	161.7809	N = 896
Gross tertiary education enrolment ratio	schet	WDI and UNESCO annual statistics	Risk aversion	39.45119	22.22441	20.3774	9.254473	2	98.09171	N = 896
Agriculture value added %of GDP	agva	UN Statistics	Informal risk sharing institutions	7.886519	7.412911	7.215328	1.9398	0.672575	48.56594	N = 896
Telephone mainlines per (100)	tel	WDI	Infrastructural development	29.97775	20.47285	20.19004	4.281579	0.32574	74.46233	N = 896
democracy	democ	Polity IV Project, Monty G. Marshall and Keith Jaggers	Institutional quality	7.581473	3.415059	3.207035	1.244962	0	10	N = 896
autocracy	autoc	Polity IV Project, Monty G. Marshall and Keith Jaggers	Institutional quality	0.996652	2.398554	2.25553	0.866549	0	10	N = 896
Polity2	polity2	Polity IV Project, Monty G. Marshall and Keith Jaggers	Institutional quality	6.59933	5.61295	5.305052	1.957884	-10	10	N = 896
Real interest rate (%)	reair	WDI	lending interest rate	5.910501	11.61522	6.975278	9.331359	-91.7244	86.97994	N = 896
Inflation, consumer prices (annual %)	infcp	WDI	Inflation	21.98737	196.4588	63.1434	186.2144	-13.3524	4734.915	N = 896

Countries, N: 56, Algeria, Argentina, Australia, Belgium, Brazil, Bulgaria, Canada, Chile, China, Colombia, Costa Rica, Croatia, Cyprus, Czech Republic, Denmark, Dominican Republic, Egypt, Finland, France, Germany , Greece, Hungary, India, Indonesia, Ireland, Israel, Italy, Japan, Kenya, Korea, Malaysia, Mexico, Morocco, Netherlands, New Zealand, Nigeria, Oman, Pakistan, Panama, Peru, Philippines, Poland, Portugal, Saudi Arabia, Slovak, Slovenia, South Africa, Spain, Sweden, Switzerland, Turkey, Ukraine, United Kingdom, United States, Uruguay, Venezuela.

Table 4-1 D: Correlation Matrix for Balanced Dataset of 56 Countries over 1993-2008

	lifpen	lifden	prcpc	gdppc	lifex	liql	sches	schet	agva	tel	democ	autoc	polity2	reair	infcp
lifpen	1														
lifden	0.8361***	1													
prcpc	0.6382***	0.8391***	1												
gdppc	0.6424***	0.8337***	0.8957***	1											
lifex	0.2609***	0.4412***	0.5207***	0.653***	1										
liql	0.4295***	0.5135***	0.6029***	0.5112***	0.4127***	1									
sches	0.4697***	0.4664***	0.4978***	0.6531***	0.6775***	0.2658***	1								
schet	0.398***	0.4646***	0.515****	0.6567***	0.672***	0.1838***	0.7337***	1							
agva	-0.4381***	-0.4307***	-0.4838***	-0.6267***	-0.8067***	-0.3001***	-0.7161***	-0.6049***	1						
tel	0.5265***	0.6278***	0.7153***	0.8544***	0.7285***	0.4564***	0.7704***	0.7472***	-0.6648***	1					
democ	0.3848***	0.3723***	0.4152***	0.5033***	0.5035***	0.174***	0.5844***	0.58***	-0.4972***	0.6307***	1				
autoc	-0.278***	-0.2364***	-0.2432***	-0.2778***	-0.28***	-0.0474	-0.3792***	-0.4439***	0.2721***	-0.4144***	-0.8655***	1			
polity2	0.3554***	0.3265***	0.3552***	0.4229***	0.4237***	0.1246***	0.5178***	0.5406***	-0.4203***	0.5584***	0.9725***	-0.955***	1		
reair	-0.0998***	-0.1182***	-0.1211***	-0.1093***	-0.0256	-0.0928***	0.0029	-0.0851**	-0.0118	-0.081**	0.0679**	-0.1001***	0.0851**	1	
infcp	-0.0704**	-0.0579*	-0.0655**	-0.0824**	-0.0703**	-0.0643*	-0.0539	-0.0455	0.1019**	-0.0712**	-0.0411	-0.0151	-0.0188	-0.3312***	1

"***","**" and "***" indicate significance at 1%, 5% and 10% respectively.

Table 4- 2: Results of CSD Test of a Balanced Dataset of 56 Countries over 1993-2008.							
Variable	Moran's I, z	p-value	Variable	ρ	CD, Pesaran	P-value	CD_{LM} ,Frees
agva	1.258	0.104	Δagva	0.227	7.602***	0	0.468**
loggdppc	4.696***	0	Δloggdppc	0.296	21.331***	0	3.982***
logprcpc	4.623***	0	Δlogprcpc	0.36	28.604***	0	6.373***
laginfcp	-0.267	0.395	Δlaginfcp	0.251	10.384***	0	0.694**
tel	4.213***	0	Δtel	0.379	33.803***	0	8.487***
schet	3.302***	0	Δschet	0.25	-0.632	1.4728	1.254***
sches	4.576***	0	Δsches	0.247	3.555***	0.0004	0.977***
liql	1.447*	0.074	Δliql	0.242	7.032***	0	0.898***
lifex	2.855***	0.002	Δlifex	0.283	13.014***	0	3.935***
loglifpen	2.524***	0.006	Δloglifpen	0.229	4.355***	0	0.59**
loglifden	3.892***	0	Δloglifden	0.231	3.978***	0.0001	0.742**
reair	-3.021***	0.001	Δreair	0.227	3.603***	0.0003	0.33
democ	3.067***	0.001	Δdem	..	..	..	..
autoc	2.018**	0.022	Δautoc	..	..	..	..
polity2	2.66***	0.004	Δpolity2	..	..	..	..
			Δtel_98c, 1960-2009	0.308	38.324***	0	10.031***
			Δlifex_98c, 1960-2009	0.374	46.507***	0	13.355***
			Δagva_98c, 1960-2009	0.207	10.281***	0	0.723***

"***”,"**"and "*" indicate significance at 1%, 5% and 10% respectively

Critical values from Frees' Q distribution						
period 1993-2008	alpha	=	0.01	:	0.3351	
Δtel_98c,1960-2009	alpha	=	0.01	:	0.4649	
Δlifex_98c,1960-2009	alpha	=	0.01	:	0.4649	
Δagva_98c,1960-2009	alpha	=	0.01	:	0.2601	

CSD = Cross Section Dependence; Δ denotes first difference

Table 4-3: Summary of M-W-PP Test Results							
Series:	Liql	Log GDP pc	Loglifeden	Loglifpen	pcrpc	Reair	Infcp
Exogenous variables: Individual effects							
Number of observations:	3454	3845	2277	2352	3979	2323	3769
Cross-sections included:	88	92	88	91	98	93	95
Statistic	134.808	172.095	163.190	171.848	113.709	1155.1	1913.26
Probability	0.9908	0.7256	0.7468	0.6940	1	0	0
Exogenous variables: Individual effects, individual linear trends							
Number of observations:	3454	3845	2274	2346	3979	2323	3769
Cross-sections included:	88	92	87	89	98	93	95
Statistic	181.855	169.879	137.669	144.485	168.803	708.393	578.889
Probability	0.3654	0.7645	0.9806	0.9690	0.9206	0	0

M-W-PP =Maddala-WU-Phillips-Perron Fisher Type Test; Newey-West automatic bandwidth selection and Bartlett kernel; the test is conducted using for the dataset over 1960-2009

Table 4-3: *(continued)*							
Series:	Δ(LIQL)	Δ(LOGGDPPC)	Δ(LOGLIFDEN)	Δ(LOGLIFPEN)	ΔPCRPC	Δ(REAIR)	Δ(INFCP)
Exogenous variables: Individual effects							
Number of observations:	3355	3752	2170	2238	3869	2227	3674
Cross-sections included:	88	92	86	88	98	93	95
Statistic	1887.77	1299.62	1224.08	1300.94	582.028	3954.07	3253.25
Probability	0	0	0	0	0	0	0
Exogenous variables: Individual effects, individual linear trends							
Number of observations:	3355	3752	2161	2232	3869	2227	3674
Cross-sections included:	88	92	83	86	98	93	95
Statistic	2483.88	1360.40	1727.39	1915.84	898.791	5586.35	7296.47
Probability	0	0	0	0	0	0	0

M-W-PP =Maddala-WU-Phillips-Perron Fisher Type Test; Newey-West automatic bandwidth selection and Bartlett kernel

Table 4- 4: summary of CIPS Test Results												
variable	pcrpc				loglifden				loglifpen			
	with a constant		with a constant and trend		with a constant		with a constant and trend		with a constant		with a constant and trend	
	Z[t-bar]	P-value	Z[t-bar]	P-value	Z[t-bar]	P-value	Z[t-bar]	P-value	Z[t-bar]	P-value	Z[t-bar]	P-value
	8.065	1.000	13.984	1.000	6.649	1.000	4.568	1.000	6.530	1.00	6.207	1.000
obs	3761		3761		2213		2213		2283		2283	
countries	98		98		89		89		92		92	
Variable	Δpcrpc				Δloglifden				Δloglifpen			
	with a constant		with a constant and trend		with a constant		with a constant and trend		with a constant		with a constant and trend	
	Z[t-bar]	P-value	Z[t-bar]	P-value	Z[t-bar]	P-value	Z[t-bar]	P-value	Z[t-bar]	P-value	Z[t-bar]	P-value
	-19.331	0.000	-14.536	0.000	-6.859	0.000	-4.805	0.000	-8.221	0.000	-5.931	0.000
obs	3761		3761		2117		2117		2182		2182	
countries	98		98		89		89		92		92	
variable	infcp				liql				logdppc			
	with a constant		with a constant and trend		with a constant		with a constant and trend		with a constant		with a constant and	
	Z[t-bar]	P-value	Z[t-bar]	P-value	Z[t-bar]	P-value	Z[t-bar]	P-value	Z[t-bar]	P-value	Z[t-bar]	P-value
	-10.229	0.000	-7.353	0.000	3.569	1.000	4.075	1.000	0.746	0.772	0.910	0.818
obs	3674		3674		3718		3718		4011		4011	
countries	95		95		98		98		98		98	
variable	Δinfcp				Δliql				Δlogdppc			
	with a constant		with a constant and trend		with a constant		with a constant and trend		with a constant		with a constant and trend	
	Z[t-bar]	P-value	Z[t-bar]	P-value	Z[t-bar]	P-value	Z[t-bar]	P-value	Z[t-bar]	P-value	Z[t-bar]	P-value
	-31.920	0.000	-28.612	0.000	-22.642	0.000	-19.065	0.000	-19.156	0.000	-16.380	0.000
obs	3579		3579		3610		3610		3911		3911	
countries	95		95		98		98		98		98	
Variable	reair				Δreair							
	with a constant		with a constant and trend		with a constant		with a constant and trend					
	Z[t-bar]	P-value	Z[t-bar]	P-value	Z[t-bar]	P-value	Z[t-bar]	P-value				
	-7.421	0.000	-5.898	0.000	-23.848	0.000	-19.242	0.000				
obs	2226		2226		2131		2131					
countries	93		93		93		93					

H_0: Unit Root, the test is conducted using for the dataset over 1960-2009; obs=observations

Table 4- 5: Summary of CIPS Test Results for 50 countries over 1960-2009

Series:	liql	loggdppc	loglifden	loglifpen	democ	pcrpc	tel	infcp	reair	agva	lifex	autoc	sches
With a constant													
Number of observations:	1627	1262	1300	1336	1437	2015	1602	628	552	1153	1358	1280	1459
Z[t-bar] Statistic	4.882	1.172	4.380	2.084	-0.787	-0.662	-0.875	-1.622	-1.142	-1.045	1.222	0.933	0.286
P-value	1.000	0.879	1.000	0.981	0.216	0.254	0.191	0.052	0.127	0.148	0.889	0.825	0.613
with a constant and trend													
Number of observations:	1627	1262	1300	1336	1437	2015	1602	628	552	1153	1358	1280	1459
Z[t-bar] Statistic	2.861	0.301	0.984	1.952	1.034	3.534	4.092	-0.578	1.133	0.342	4.075	3.045	2.561
P-value	0.998	0.618	0.837	0.975	0.849	1.000	1.000	0.281	0.871	0.634	1.000	0.999	0.995

Table 4- 5 : (continued)

Series:	Δ(loggdppc)	Δ(loglifden)	Δ(loglifpen)	Δdemoc	Δpcrpc	Δ(tel)	Δ(infcp)	Δreair	Δgva	Δlifex	Δautoc	Δliql	Δsches
With a constant													
Number of observations:	1231	1244	1280	1403	1959	1551	613	532	1124	1321	1250	1582	1331
Z[t-bar] Statistic	-11.522	-8.718	-10.230	-14.514	-11.737	-4.366	-13.346	-9.254	-21.906	-5.393	-12.124	-15.709	-11.915
P-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
with a constant and trend													
Number of observations:	1231	1244	1280	1403	1959	1551	613	532	1124	1321	1250	1582	1331
Z[t-bar] Statistic	-10.089	-6.790	-7.356	-12.795	-8.456	-3.797	-11.735	-7.678	-20.650	-3.151	-10.558	-13.991	-8.062
P-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Countries are: Algeria, Austria, Bulgaria, Cameroon, Canada, China, Costa Rica, Côte d'Ivoire, Croatia, Czech Republic, Denmark, Dominican Republic, Ecuador, El-Salvador, France, Germany, Greece, Hungary, Iceland, India, Iran, Islamic Rep., Ireland, Israel, Jordan, Kuwait, Lebanon, Lithuania, Malaysia, Mexico, Morocco, Netherlands, Nigeria , Norway, Peru, Portugal, Romania, Saudi Arabia, Slovak Republic, Slovenia, Spain, Sri Lanka, Switzerland, Thailand, Trinidad and Tobago, Tunisia, Turkey, United Kingdom, United States, Uruguay, and Venezuela.

Table 4-6A: Summary of Cointegration Test Results								
Cointegration test	Specification : LOGLIFPEN PCRPC SCHES AGVA TEL LIQL LOGGDPPC							
	Demeaned data				De-trended data		De-trended and cross-sectionally de-meaned data	
	Without trend		With trend					
Method	Statistic	Prob.	Statistic	Prob.	Statistic	Prob.	Statistic	Prob.
Pedroni Panel ADF-Statistic	-3.350644	0.0004	-3.771212	0.0001	-3.515491	0.0002	-3.515491	0.0002
Pedroni Group ADF-Statistic	-4.572857	0.0000	-5.542866	0.0000	-5.733025	0.0000	-5.733025	0.0000
							$CADFC_P$	
$CADFC_P$ Cointegration test results based on original data and CCE approach							Statistic	Prob.
							-6.21	0.000
Cointegration test	Specification : LOGLIFPEN LIFEX PCRPC SCHES TEL LIQL LOGGDPPC							
	Demeaned data				De-trended data		De-trended and cross-sectionally de-meaned data	
	Without trend		With trend					
Method	Statistic	Prob.	Statistic	Prob.	Statistic	Prob.	Statistic	Prob.
Pedroni Panel ADF-Statistic	-3.749016	0.0001	-5.714429	0.0000	-6.409841	0.0000	-6.409841	0.0000
Pedroni Group ADF-Statistic	-6.830400	0.0000	-5.561636	0.0000	-6.938347	0.0000	-6.938347	0.0000
							$CADFC_P$	
$CADFC_P$ Cointegration test results based on original data and CCE approach							Statistic	Prob.
							-5.93	0.000

Table 4- 6A :(continued)								
Cointegration test	LOGLIFDEN AGVA PCRPC SCHES TEL LIQL LOGGDPPC							
	Demeaned data				De-trended data		De-trended and cross-sectionally de-meaned data	
	Without trend		With trend					
Method	Statistic	Prob.	Statistic	Prob.	Statistic	Prob.	Statistic	Prob.
Pedroni Panel ADF-Statistic	-3.350676	0.0004	-3.771243	0.0001	-3.442533	0.0003	-1.626263	0.0519
Pedroni Group ADF-Statistic	-4.572740	0.0000	-5.542717	0.0000	-6.276759	0.0000	-4.372785	0.0000
							$CADFC_P$	
$CADFC_P$ Cointegration test results based on original data and CCE approach							Statistic	Prob.
							-6.65	0.000
Cointegration test	LOGLIFDEN LIFEX PCRPC SCHES TEL LIQL LOGGDPPC							
	Demeaned data				De-trended data		De-trended and cross-sectionally de-meaned data	
	Without trend		With trend					
Method	Statistic	Prob.	Statistic	Prob.	Statistic	Prob.	Statistic	Prob.
Pedroni Panel ADF-Statistic	-5.275825	0.0000	-5.714420	0.0000	-5.613690	0.0000	-5.613690	0.0000
Pedroni Group ADF-Statistic	-6.829973	0.0000	-5.561758	0.0000	-7.280626	0.0000	-7.280626	0.0000
							$CADFC_P$	
$CADFC_P$ Cointegration test results based on original data and CCE approach							Statistic	Prob.
							-6.30	0.000
$CADFC_P$ cointegration test results based on original data and CCE approach							$CADFC_P$	
Specification							Statistic	Prob.
LOGLIFDEN LIFEX PCRPC SCHES TEL LIQL LOGGDPPC DEMOC REAIR INFCP							-11.58	0.000
LOGLIFPEN LIFEX PCRPC SCHES TEL LIQL LOGGDPPC DEMOC REAIR INFCP							-11.33	0.000

Note that the Pedroni test in EViews 7.1 allows inclusion of at most seven variables, therefore we try to alternate between some of the variables, and the results were almost the same.

Table 4-6B Estimation Results of Error Correction Model using CCEP		
VARIABLES	Δloglifden	Δloglifpen
$\Delta loggdppc_{t-1}$	0.503*	
	(0.264)	
$\Delta loglifden_{t-1}$	0.232***	
	(0.0468)	
$\Delta loglifden_{t-2}$	0.167***	
	(0.0300)	
$\Delta loglifden_{t-3}$	0.119***	
	(0.0293)	
$ECT_{d,t-1}$	-0.520***	
	(0.0727)	
$\Delta loglifpen_{t-1}$		0.196***
		(0.0571)
$ECT_{p,t-1}$		-0.447***
		(0.0605)
$\Delta loglifpen_{t-3}$		0.104***
		(0.0264)
Constant	0.0195**	0.0309***
	(0.00781)	(0.00313)
Observations	895	903
R-squared	0.183	0.165
Number of countries	50	50
Adj. R-squared	0.178	0.162
Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1		

Table 4- 6C: Granger Causality Test Results Using the CCEP				
VARIABLES	Δloglifpen	Δloglifden	Δlogpcrpc	Δlogpcrpc
Δloggdppc$_{t-1}$	0.501	0.706	0.953**	1.036**
	(0.416)	(0.455)	(0.418)	(0.433)
Δsches$_{t-1}$	-6.86e-05	-7.75e-05	-0.000162*	-0.000163**
	(8.85e-05)	(8.93e-05)	(8.46e-05)	(7.52e-05)
Δloglifden$_{t-2}$		0.0452		-0.0663**
		(0.0763)		(0.0321)
Δloggdppc$_{t-2}$	-0.450	-0.456	-0.874**	-0.964**
	(0.399)	(0.393)	(0.390)	(0.413)
Δsches$_{t-3}$	-5.36e-05	-3.46e-05	-0.000184*	-0.000189**
	(8.28e-05)	(8.26e-05)	(9.73e-05)	(9.32e-05)
Δsches$_{t-4}$	-7.67e-05	-3.85e-05	-9.34e-05**	-9.24e-05**
	(7.66e-05)	(7.81e-05)	(4.28e-05)	(4.06e-05)
Δlogpcrpc$_{t-1}$	-0.00180	-0.00603	0.421***	0.417***
	(0.0869)	(0.0884)	(0.114)	(0.133)
Δlogpcrpc$_{t-3}$	-5.57e-05	-0.00932	0.158**	0.138
	(0.131)	(0.130)	(0.0714)	(0.0859)
Δagva$_{t-1}$	0.0182*	0.0187*	0.00457	0.00171
	(0.00961)	(0.00984)	(0.00688)	(0.00618)
Δagva$_{t-2}$	0.0127*	0.0124	-0.00877	-0.00919
	(0.00750)	(0.00748)	(0.00724)	(0.00737)
Δloglifpen$_{t-2}$	0.0678		-0.0707**	
	(0.0728)		(0.0319)	
Δliql$_{t-1}$	-0.00242	-0.00200	-0.00185*	-0.00227*
	(0.00205)	(0.00217)	(0.000974)	(0.00117)
Δliql$_{t-2}$	-0.000272	-0.000321	-0.00445***	-0.00458**
	(0.00155)	(0.00146)	(0.00165)	(0.00174)
ECT $_{p,t-1}$	-0.227***			
	(0.0480)			
ECT$_{d,t-1}$		-0.208***		
		(0.0487)		
ECT$_{c,p,t-1}$			-0.262***	
			(0.0729)	
ECT $_{c,d,t-1}$				-0.284***
				(0.0709)
Constant	0.116	0.327	0.295**	0.308
	(0.260)	(0.838)	(0.133)	(0.478)
Observations	612	611	613	613
R-squared	0.420	0.423	0.627	0.627
Number of countries	48	48	49	49
Adj. R-squared	0.229	0.233	0.504	0.504
standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1				

Table 4- 7A : FE Estimation Results of Dataset of 98 Countries over 1960-2009

	FE	FE	FE	FE	FE	FE	FE	FE	FE	FE	FE	FE
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Variables	loglifden	loglifden	loglifden	loglifden	loglifden	loglifden	loglifpen	loglifpen	loglifpen	loglifpen	loglifpen	loglifpen
logpcrpc	0.110***	0.107***	0.109***	0.158***	0.159***	0.160***	0.110***	0.107***	0.109***	0.158***	0.159***	0.160***
	(0.0367)	(0.0369)	(0.0368)	(0.0342)	(0.0343)	(0.0342)	(0.0367)	(0.0369)	(0.0368)	(0.0342)	(0.0343)	(0.0342)
loggdppc	1.347***	1.348***	1.346***	1.345***	1.344***	1.345***	0.347**	0.348**	0.346**	0.345***	0.344***	0.345***
	(0.144)	(0.145)	(0.144)	(0.128)	(0.128)	(0.128)	(0.144)	(0.145)	(0.144)	(0.128)	(0.128)	(0.128)
lifex	0.0256***	0.0257***	0.0253***	0.0197***	0.0186***	0.0187***	0.0256***	0.0257***	0.0253***	0.0197***	0.0186***	0.0187***
	(0.00768)	(0.00778)	(0.00774)	(0.00704)	(0.00707)	(0.00706)	(0.00768)	(0.00778)	(0.00774)	(0.00704)	(0.00707)	(0.00706)
agva	-0.0262***	-0.0279***	-0.0270***	-0.0178***	-0.0191***	-0.0179***	-0.0262***	-0.0279***	-0.0270***	-0.0178***	-0.0191***	-0.0179***
	(0.00701)	(0.00691)	(0.00697)	(0.00597)	(0.00588)	(0.00593)	(0.00701)	(0.00691)	(0.00697)	(0.00597)	(0.00588)	(0.00593)
tel	0.0241***	0.0243***	0.0243***	0.0260***	0.0263***	0.0261***	0.0241***	0.0243***	0.0243***	0.0260***	0.0263***	0.0261***
	(0.00265)	(0.00265)	(0.00265)	(0.00243)	(0.00243)	(0.00243)	(0.00265)	(0.00265)	(0.00265)	(0.00243)	(0.00243)	(0.00243)
schet	0.00191	0.00184	0.00190				0.00191	0.00184	0.00190			
	(0.00160)	(0.00160)	(0.00160)				(0.00160)	(0.00160)	(0.00160)			
sches				0.000619	0.000605	0.000608				0.000619	0.000605	0.000608
				(0.000384)	(0.000384)	(0.000384)				(0.000384)	(0.000384)	(0.000384)
reair	-0.00107	-0.00116	-0.00111	0.00159	0.00139	0.00151	-0.00107	-0.00116	-0.00111	0.00159	0.00139	0.00151
	(0.00161)	(0.00161)	(0.00161)	(0.00146)	(0.00146)	(0.00146)	(0.00161)	(0.00161)	(0.00161)	(0.00146)	(0.00146)	(0.00146)
liql	-0.000644	-0.000565	-0.000613	-0.000661	-0.000644	-0.000679	-0.000644	-0.000565	-0.000613	-0.000661	-0.000644	-0.000679
	(0.00109)	(0.00109)	(0.00109)	(0.00103)	(0.00103)	(0.00103)	(0.00109)	(0.00109)	(0.00109)	(0.00103)	(0.00103)	(0.00103)
L.infcp	0.000601***	0.000597***	0.000600***	0.000631***	0.000630***	0.000633***	0.000601***	0.000597***	0.000600***	0.000631***	0.000630***	0.000633***
	(9.13e-05)	(9.14e-05)	(9.14e-05)	(8.88e-05)	(8.88e-05)	(8.88e-05)	(9.13e-05)	(9.14e-05)	(9.14e-05)	(8.88e-05)	(8.88e-05)	(8.88e-05)
democ	0.0129			0.0198**			0.0129			0.0198**		
	(0.00904)			(0.00818)			(0.00904)			(0.00818)		
autoc		-0.00706			-0.0245**			-0.00706			-0.0245**	
		(0.0120)			(0.0105)			(0.0120)			(0.0105)	
polity2			0.00590			0.0132***			0.00590			0.0132***
			(0.00554)			(0.00496)			(0.00554)			(0.00496)
Constant	-10.37***	-10.26***	-10.28***	-10.22***	-9.953***	-10.09***	-10.37***	-10.26***	-10.28***	-10.22***	-9.953***	-10.09***
	(1.151)	(1.162)	(1.154)	(0.962)	(0.966)	(0.962)	(1.151)	(1.162)	(1.154)	(0.962)	(0.966)	(0.962)
Observations	1,214	1,214	1,214	1,338	1,338	1,338	1,214	1,214	1,214	1,338	1,338	1,338
R-squared	0.667	0.666	0.666	0.647	0.647	0.648	0.480	0.479	0.480	0.456	0.456	0.457
Number of id (countries)	83	83	83	83	83	83	83	83	83	83	83	83
Adj. R-squared	0.639	0.639	0.639	0.621	0.621	0.622	0.438	0.437	0.437	0.416	0.416	0.417

Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1; L.infcp=lag inflation

Table 4-7B: Estimation Results of Dataset of 98 Countries over 1960-2009 (CCEP)

	CCEP	CCEP	CCEP	CCEP	CCEP	CCEP	CCEP	CCEP	CCEP	CCEP	CCEP	CCEP
	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)
Variables	loglifden	loglifden	loglifden	loglifden	loglifden	loglifden	loglifpen	loglifpen	loglifpen	loglifpen	loglifpen	loglifpen
logpcrpc	0.129***	0.123***	0.126***	0.178***	0.173***	0.175***	0.129***	0.124***	0.127***	0.180***	0.175***	0.177***
	(0.0395)	(0.0396)	(0.0395)	(0.0366)	(0.0365)	(0.0365)	(0.0396)	(0.0397)	(0.0396)	(0.0366)	(0.0366)	(0.0366)
loggdppc	1.247***	1.242***	1.243***	1.182***	1.175***	1.178***	0.246	0.242	0.242	0.181	0.173	0.176
	(0.153)	(0.153)	(0.153)	(0.139)	(0.140)	(0.140)	(0.153)	(0.153)	(0.153)	(0.139)	(0.140)	(0.140)
lifex	0.0223***	0.0227***	0.0221***	0.0156**	0.0151**	0.0150**	0.0224***	0.0227***	0.0222***	0.0159**	0.0153**	0.0152**
	(0.00781)	(0.00788)	(0.00786)	(0.00708)	(0.00711)	(0.00710)	(0.00782)	(0.00789)	(0.00787)	(0.00708)	(0.00711)	(0.00710)
agva	-0.0245***	-0.0263***	-0.0256***	-0.0163***	-0.0180***	-0.0169***	-0.0245***	-0.0263***	-0.0256***	-0.0162***	-0.0179***	-0.0168***
	(0.00707)	(0.00696)	(0.00702)	(0.00596)	(0.00586)	(0.00591)	(0.00708)	(0.00697)	(0.00703)	(0.00596)	(0.00586)	(0.00592)
tel	0.0219***	0.0222***	0.0221***	0.0224***	0.0233***	0.0231***	0.0219***	0.0222***	0.0221***	0.0223***	0.0233***	0.0230***
	(0.00343)	(0.00342)	(0.00343)	(0.00306)	(0.00311)	(0.00311)	(0.00343)	(0.00342)	(0.00343)	(0.00305)	(0.00311)	(0.00310)
schet	-0.000188	-0.000333	-0.000198				-0.000188	-0.000326	-0.000197			
	(0.00176)	(0.00177)	(0.00177)				(0.00177)	(0.00177)	(0.00177)			
sches				0.000468	0.000468	0.000468				0.000463	0.000467	0.000466
				(0.000385)	(0.000385)	(0.000385)				(0.000385)	(0.000385)	(0.000385)
reair	-0.000996	-0.000989	-0.00101	0.00133	0.00122	0.00126	-0.000985	-0.000985	-0.000999	0.00138	0.00124	0.00129
	(0.00164)	(0.00164)	(0.00164)	(0.00149)	(0.00149)	(0.00149)	(0.00164)	(0.00164)	(0.00164)	(0.00149)	(0.00149)	(0.00149)
liql	-0.000899	-0.000722	-0.000789	-0.00104	-0.000850	-0.000926	-0.000911	-0.000723	-0.000797	-0.00111	-0.000914	-0.000992
	(0.00112)	(0.00112)	(0.00112)	(0.00105)	(0.00105)	(0.00105)	(0.00113)	(0.00112)	(0.00113)	(0.00105)	(0.00105)	(0.00105)
L.infcp	0.000620***	0.000618***	0.000620***	0.000645***	0.000644***	0.000646***	0.000620***	0.000618***	0.000620***	0.000646***	0.000645***	0.000646***
	(9.20e-05)	(9.21e-05)	(9.21e-05)	(8.88e-05)	(8.89e-05)	(8.88e-05)	(9.20e-05)	(9.21e-05)	(9.21e-05)	(8.88e-05)	(8.88e-05)	(8.88e-05)
democ	0.00951			0.0165**			0.00931			0.0163**		
	(0.00916)			(0.00827)			(0.00915)			(0.00826)		
autoc		0.00260			-0.0135			0.00266			-0.0134	
		(0.0122)			(0.0109)			(0.0122)			(0.0109)	
polity2			0.00254			0.00927*			0.00249			0.00921*
			(0.00562)			(0.00506)			(0.00562)			(0.00506)
Constant	-2.004	5.295	3.617	-2.590	5.337	3.587	-0.786	5.778	4.214	-1.326	5.971	4.291
	(13.42)	(11.45)	(12.58)	(11.20)	(10.81)	(11.86)	(13.13)	(11.27)	(12.35)	(11.21)	(10.65)	(11.65)
Observations	1,214	1,214	1,214	1,338	1,338	1,338	1,214	1,214	1,214	1,338	1,338	1,338
R-squared	0.674	0.674	0.674	0.657	0.657	0.657	0.492	0.491	0.491	0.472	0.471	0.472
Number of id (countries)	83	83	83	83	83	83	83	83	83	83	83	83
Adj. R-squared	0.644	0.644	0.643	0.629	0.628	0.629	0.444	0.444	0.444	0.428	0.427	0.428

Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1; L.infcp=lag inflation

Table 4-7C: Spatial MLE Estimation Results

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	loglifpen	loglifpen	loglifpen	loglifpen	loglifpen	loglifpen	loglifden	loglifden	loglifden	loglifden	loglifden	loglifden
loggdppc	-0.4936883 ***	-0.45647***	-0.53989***	-0.50999***	-0.43308***	-0.39304***	0.506312***	0.543528***	0.460111***	0.490008***	0.566915***	0.60696***
	(0.10522)	(0.103413)	(0.106814)	(0.104833)	(0.105769)	(0.104044)	(0.105222)	(0.103413)	(0.106814)	(0.104833)	(0.105769)	0.104044)
logpcrpc	0.7068584***	0.673693***	0.687173***	0.660995***	0.725895***	0.687555***	0.706858***	0.673693***	0.687173***	0.660995***	0.725895***	0.687555***
	(0.0562)	(0.054856)	(0.056687)	(0.055356)	(0.056864)	(0.055396)	(0.056197)	(0.054856)	(0.056687)	(0.055356)	(0.056864)	(0.055396)
agva	-0.018163***	-0.0154*	-0.0229***	-0.02005**	-0.01467	-0.01143	-0.01816***	-0.0154	-0.0229***	-0.02005**	-0.01467	-0.01143
	(0.0090359)	(0.009158)	(0.00913)	(0.009258)	(0.009103)	(0.009216)	(0.009036)	(0.009158)	(0.00913)	(0.009258)	(0.009103)	(0.009216)
tel	0.0169176***	0.01299***	0.017856***	0.014503***	0.017697***	0.013076***	0.016918***	0.01299***	0.017856***	0.014503***	0.017697***	0.013076***
	(0.00372)	(0.003799)	(0.003756)	(0.003824)	(0.003736)	(0.003826)	(0.003721)	(0.003799)	(0.003756)	(0.003824)	(0.003736)	(0.003826)
sches		0.004113**		0.003923*		0.004897***		0.004113***		0.003923		0.004897***
		(0.002045)		(0.002072)		(0.00205)		(0.002045)		(0.002072)		(0.00205)
schet	-0.00246		-0.00154		-0.0027		-0.00246		-0.00154		-0.0027	
	(0.00228)		(0.002297)		(0.002297)		(0.002277)		(0.002297)		(0.002297)	
liql	0.0055474***	0.006305***	0.005676***	0.006265***	0.005211***	0.00609***	0.005547***	0.006305***	0.005676***	0.006265***	0.005211***	0.00609***
	(0.00105)	(0.000996)	(0.001059)	(0.001007)	(0.001055)	(0.001002)	(0.001047)	(0.000996)	(0.001059)	(0.001007)	(0.001055)	(0.001002)
lifex	-0.0540258***	-0.05857***	-0.0576***	-0.06079***	-0.05222***	-0.05735***	-0.05403***	-0.05857***	-0.0576***	-0.06079***	-0.05222***	-0.05735***
	(0.00926)	(0.008736)	(0.009356)	(0.008832)	(0.009342)	(0.008793)	(0.009264)	(0.008736)	(0.009356)	(0.008832)	(0.009342)	(0.008793)
polity2	0.0909762***	0.088262***			.		0.090976***	0.088262***				
	(0.00641)	(0.006294)					(0.006409)	(0.006294)				
democ			0.151163***	0.147262***					0.151163***	0.147262***		
			(0.011428)	(0.011274)					(0.011428)	(0.011274)		
autoc					-0.18967***	-0.18367***					-0.18967***	-0.18367***
					(0.013809)	(0.013477)					(0.013809)	(0.013477)
reair	0.002828	0.002686	0.003401	0.003103	0.003127	0.002895	0.002828	0.002686	0.003401	0.003103	0.003127	0.002895
	(0.00261)	(0.002582)	(0.002632)	(0.002607)	(0.002628)	(0.0026)	(0.002608)	(0.002582)	(0.002632)	(0.002607)	(0.002628)	(0.0026)
laginfcp	0.0008662***	0.000847***	0.000887***	0.000868***	0.000857***	0.000833***	0.000866***	0.000847***	0.000887***	0.000868***	0.000857***	0.000833***
	(0.00011)	(0.000111)	(0.000111)	(0.000112)	(0.000112)	(0.000112)	(0.000111)	(0.000111)	(0.000111)	(0.000112)	(0.000112)	(0.000112)
cons	0.15871	-0.42568	-0.01174	-0.28071	-0.1133	-0.43626	-0.15871	-0.42568	-0.01174	-0.28071	-0.1133	-0.43626
	(0.854614)	(0.865724)	(0.864996)	(0.87637)	(0.859414)	(0.869983)	(0.854614)	(0.865723)	(0.864996)	(0.87637)	(0.859414)	(0.869983)
Rho	0.6701172***	0.669468***	0.680809***	0.680221***	0.656367***	0.656354***	0.670117***	0.669468***	0.680809***	0.680221***	0.656367***	0.656354***
	(0.03873)	(0.038927)	(0.037651)	(0.037788)	(0.040133)	(0.040323)	(0.038732)	(0.038927)	(0.037651)	(0.037788)	(0.040133)	(0.040323)
Variance ratio	0.745	0.743	0.738	0.736	0.74	0.737	0.949	0.948	0.946	0.945	0.947	0.946
Squared corr.	0.665	0.666	0.652	0.653	0.666	0.668	0.87	0.871	0.865	0.866	0.871	0.872
Sigma	0.8	0.8	0.81	0.8	0.8	0.8	0.8	0.8	0.81	0.8	0.8	0.8
Number of obs.	896	896	896	896	896	896	896	896	896	896	896	896

Standard errors in parentheses;*** p<0.01, ** p<0.05, * p<0.1; Using Balanced Dataset for 56 Countries over 1993-2008, w is Row-standardized

Table 4-7 D: OLS Regression Results of Dataset1 of 98 Countries††		
Variables	loglifpen	loglifden
Log GDP per capita	-0.739**	0.350
	(0.315)	(0.321)
Log private credit per capita	0.202*	0.181*
	(0.102)	(0.105)
Life expectancy	-0.0544*	-0.0589**
	(0.0278)	(0.0284)
Liquid liability	0.00428*	0.00422
	(0.00250)	(0.00255)
Agriculture value added	-0.118***	-0.117***
	(0.0299)	(0.0305)
Telephone mainlines	0.0344**	0.0326**
	(0.0150)	(0.0153)
Real interest rates	0.00425	0.000254
	(0.0135)	(0.0138)
Inflation	-0.000649	-0.000639
	(0.000583)	(0.000595)
Protestant	-0.109	-0.0817
	(0.951)	(0.970)
Catholic	-0.125	-0.120
	(0.525)	(0.536)
Orthodox	-1.190*	-1.216*
	(0.656)	(0.669)
Muslim	-1.861***	-1.763***
	(0.556)	(0.568)
Buddhist	0.305	0.460
	(0.908)	(0.926)
Hindus	1.465	1.682
	(1.032)	(1.053)
Legal origin_UK	0.404	0.403
	(0.737)	(0.752)
Legal origin_French	-0.333	-0.297
	(0.841)	(0.858)
Legal origin_Socialistic	-0.676	-0.544
	(0.879)	(0.896)
Legal origin_German	0.307	0.275
	(0.788)	(0.804)
Constant	5.214	4.912
	(3.162)	(3.226)
Observations	91	91
R-squared	0.754	0.905
Adj. R-squared	0.692	0.882
Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1		

†† estimation using Dataset1 of 98 Countries, averages over 1989-2009

Table 4- 8: CCEP Results Using Dataset of 98 Countries over 1960-2009 and O.C.V.												
	CCEP	CCEP	CCEP	CCEP	CCEP	CCEP	CCEP	CCEP	CCEP	CCEP	CCEP	CCEP
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Variables	loglifden	loglifden	loglifden	loglifden	loglifden	loglifden	loglifpen	loglifpen	loglifpen	loglifpen	loglifpen	loglifpen
logpcrpc	0.173***	0.171***	0.171***	0.164***	0.168***	0.167***	0.172***	0.169***	0.170***	0.164***	0.167***	0.167***
	(0.0415)	(0.0417)	(0.0416)	(0.0389)	(0.0391)	(0.0391)	(0.0415)	(0.0417)	(0.0416)	(0.0389)	(0.0391)	(0.0391)
loggdppc	1.385***	1.383***	1.383***	1.507***	1.510***	1.509***	0.384**	0.383**	0.383**	0.509***	0.511***	0.511***
	(0.159)	(0.159)	(0.159)	(0.148)	(0.148)	(0.148)	(0.159)	(0.159)	(0.159)	(0.148)	(0.148)	(0.148)
agva	-0.0164**	-0.0163**	-0.0165**	-0.00952	-0.00920	-0.00928	-0.0166**	-0.0165**	-0.0167**	-0.00959	-0.00926	-0.00936
	(0.00786)	(0.00782)	(0.00784)	(0.00714)	(0.00710)	(0.00712)	(0.00786)	(0.00782)	(0.00784)	(0.00714)	(0.00710)	(0.00712)
tel	0.0152***	0.0152***	0.0153***	0.0131***	0.0128***	0.0128***	0.0151***	0.0151***	0.0151***	0.0130***	0.0128***	0.0128***
	(0.00327)	(0.00326)	(0.00326)	(0.00303)	(0.00305)	(0.00305)	(0.00327)	(0.00326)	(0.00326)	(0.00302)	(0.00305)	(0.00305)
agdo	0.0457***	0.0456***	0.0456***	0.0447***	0.0448***	0.0448***	0.0451***	0.0449***	0.0450***	0.0441***	0.0443***	0.0442***
	(0.00972)	(0.00973)	(0.00972)	(0.00962)	(0.00961)	(0.00961)	(0.00975)	(0.00975)	(0.00975)	(0.00965)	(0.00964)	(0.00963)
socs	0.0259***	0.0260***	0.0260***	0.0259***	0.0261***	0.0261***	0.0256***	0.0257***	0.0257***	0.0258***	0.0259***	0.0259***
	(0.00684)	(0.00683)	(0.00683)	(0.00663)	(0.00664)	(0.00664)	(0.00683)	(0.00682)	(0.00682)	(0.00663)	(0.00663)	(0.00664)
L.infcp	-0.000628***	-0.000633***	-0.000636***	-0.000662***	-0.000657***	-0.000660***	-0.000625***	-0.000629***	-0.000632***	-0.000658***	-0.000652***	-0.000656***
	(0.000225)	(0.000225)	(0.000226)	(0.000222)	(0.000222)	(0.000223)	(0.000225)	(0.000225)	(0.000226)	(0.000222)	(0.000222)	(0.000223)
reair	-0.000503	-0.000435	-0.000485	5.84e-05	3.07e-05	9.19e-06	-0.000525	-0.000455	-0.000507	4.91e-05	3.02e-05	7.08e-06
	(0.00166)	(0.00166)	(0.00166)	(0.00156)	(0.00156)	(0.00156)	(0.00166)	(0.00166)	(0.00166)	(0.00156)	(0.00156)	(0.00156)
liql	-0.00106	-0.000957	-0.000979	-0.000984	-0.00100	-0.00100	-0.000983	-0.000889	-0.000911	-0.000940	-0.000964	-0.000964
	(0.00112)	(0.00112)	(0.00112)	(0.00107)	(0.00107)	(0.00107)	(0.00112)	(0.00112)	(0.00112)	(0.00107)	(0.00107)	(0.00107)
agdy	-0.00369	-0.00410	-0.00398	-0.00345	-0.00349	-0.00360	-0.00376	-0.00415	-0.00403	-0.00359	-0.00351	-0.00362
	(0.00448)	(0.00455)	(0.00452)	(0.00413)	(0.00427)	(0.00424)	(0.00448)	(0.00455)	(0.00452)	(0.00413)	(0.00426)	(0.00423)
gsav	-0.00185	-0.00194	-0.00190	-0.00229	-0.00220	-0.00222	-0.00193	-0.00203	-0.00199	-0.00236	-0.00228	-0.00230
	(0.00307)	(0.00307)	(0.00307)	(0.00288)	(0.00288)	(0.00288)	(0.00308)	(0.00308)	(0.00308)	(0.00288)	(0.00288)	(0.00288)
lifex	0.0109	0.0118	0.0115	0.000220	0.000436	0.000438	0.0106	0.0115	0.0112	5.60e-06	0.000198	0.000203
	(0.00984)	(0.00987)	(0.00986)	(0.00906)	(0.00907)	(0.00906)	(0.00984)	(0.00987)	(0.00986)	(0.00907)	(0.00907)	(0.00907)
schet	-0.00228	-0.00229	-0.00228				-0.00220	-0.00221	-0.00220			
	(0.00180)	(0.00180)	(0.00180)				(0.00180)	(0.00180)	(0.00180)			
sches				0.000341	0.000341	0.000343				0.000335	0.000336	0.000338
				(0.000347)	(0.000347)	(0.000347)				(0.000347)	(0.000346)	(0.000346)
democ	-0.00490			-0.00236			-0.00506			-0.00252		
	(0.00910)			(0.00865)			(0.00910)			(0.00865)		
autoc		0.0118			0.00118			0.0117			0.00109	
		(0.0129)			(0.0124)			(0.0129)			(0.0124)	
polity2			-0.00470			-0.000862			-0.00469			-0.000852
			(0.00575)			(0.00552)			(0.00575)			(0.00552)
Constant	-9.558	-7.269	-7.671	-5.927	-7.992	-8.662	-6.620	-4.909	-5.065	-4.736	-6.565	-7.082
	(15.25)	(14.28)	(14.66)	(15.04)	(14.09)	(14.44)	(14.99)	(14.01)	(14.38)	(14.89)	(13.84)	(14.18)
Observations	1,052	1,052	1,052	1,127	1,127	1,127	1,052	1,052	1,052	1,127	1,127	1,127
R-squared	0.722	0.723	0.723	0.705	0.705	0.705	0.546	0.546	0.546	0.520	0.520	0.520
Number of countries	72	72	72	73	73	73	72	72	72	73	73	73
Adj. R-squared	0.693	0.693	0.693	0.676	0.676	0.676	0.498	0.499	0.498	0.473	0.473	0.473

Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1; O.C.V. = other control variables

Chapter 5:

Summary of the Study and Concluding Discussion

This chapter consists of two sections. Section 5.1 summarises the findings of the study. Concluding discussions are in Section 5.2

5.1. Summary of the Findings

This thesis addresses issues of insurance development and insurance consumption variation across countries. It assesses the determinants of the demand for life and nonlife insurance consumption across countries. These include price of insurance, informal risk sharing institutions, the bequest motive, private credit consumption, institutional quality and GDP per capita. Moreover, we examine the long run economic relationship between the demand for life, nonlife insurance and its determinants using international data sets.

More specifically, chapter 2 investigates the long run economic relationship between nonlife insurance consumption and income/wealth per capita across countries taking into account observed heterogeneity and possible omitted variables. Chapter 2 also sheds light on the importance of incorporating informal insurance institutions in the analysis of the demand for nonlife insurance services.

We employed OLS cross section regression analysis using a dataset of 65 developed and developing countries for the year 2000 and using produced capital as an indicator of wealth. OLS is used as a baseline regression and for comparison purposes with existing studies. Estimation results show that, controlling for possible determinants, wealth elasticity with respect to insurance services is less than unity. However, without controlling for other determinants, we obtained wealth elasticity greater than unity close to the results in previous studies, the basis for the widely cited explanation of insurance being perceived as a luxury commodity.

In order to investigate the presence of cross section dependence we used a balanced dataset of 54 developed and emerging economies over the period 1992-2005. Diagnostic tests show the presence of cross section dependence in the data. Moreover, using an unbalanced dataset of 99 countries over the period 1987-2009 we employed panel data analysis to study the long run economic relationship between per capita consumption of nonlife insurance services and per capita income, controlling for possible determinants that derive the demand for insurance services. Panel unit root test results show nonstationarity of most variables in levels and stationarity in the first difference. We examined cointegration between nonlife insurance and income using a sample of 46 countries, the Kao (1999) test for cointegration and the $CADFC_p$ advanced by Banerjee and Carrion-i-Silvestre (2011). Test results show a long run relationship is to be expected. We also investigated the dynamic adjustment to long-run equilibrium of the demand for nonlife insurance services and its determinants using error correction model. The CCEP estimation results suggest that the error correction parameter is significant and has the expected negative sign. Also, GDP per capita, nonlife density, and nonlife penetration in the prior periods are significant in the dynamic adjustment.

The CCEP estimation results show that income elasticity is less than unity and that in addition to GDP per capita, informal institutions, the law, risk aversion and physical infrastructural development are statistically significant.

Chapter 3 investigates the long run economic relationship between the demand for life insurance and its determinants using a panel data analysis and a dataset of 98 countries over the period 1960-2009. Investigation of time series properties of the data set suggests that nonstationarity of several variables in levels and stationarity in the first difference.

Results of cointegration tests suggest that there is a long run relationship between the demand for life insurance and its determinants.

As we have established the long-run relationship, we investigated the dynamics of the demand for insurance and its determinants using an error correction model. Estimation results show that the error correction term is significant and has the expected negative sign. The results suggest that, GDP per capita, life density and life penetration in prior periods have significant impact on the dynamic adjustment.

Estimation results show that life insurance consumption variation across countries may be explained by GDP per capita, the extended family institutions, physical infrastructural development, the longevity risk indicator (old dependency ratio), social security and welfare, gross savings, anticipated inflation, risk aversion, and Islam and Orthodox being the dominant religions in a country.

As estimation results from the full dataset of developing and developed countries show that the bequest intensity indicator (young dependency ratio) is insignificant, chapter 3 also sheds light on whether types of bequest motives may have implications for life insurance consumption variations across countries. To this end, countries were grouped into (i) developing economies, (ii) industrialized (transition) economies and (iii) highly industrialized economies to study the coefficient of young and old dependency ratios in these groups of countries. For developing economies estimation results show that, the coefficients of young and old dependence ratios are negative and statistically significant. By contrast, estimation results of the sample of highly industrialized economies show that the ratios are positive and significant. For transition economies the ratios are insignificant. The results suggest that (different groups of) countries may have different bequest motives and that may have implications for the demand for life insurance. That is, societies are likely to have different types of bequest motives and the coefficient may be of opposite sign for different groups of countries. When countries are grouped in one group, coefficients of opposite signs are likely to cancel each other and become insignificant, or dominate one group. Interpretation of the results may suggest the presence of altruistic motive in highly industrialized countries and the presence of the bequest as exchange motive in developing societies.

Chapter 4 investigates the long run economic relationship and the causal direction of the relationship between life insurance development and private credit consumption across countries using a panel data analysis and a dataset of 98 countries over the period 1960-2009. Unit root tests results suggest nonstationarity of private credit consumption, and life insurance development indicators in levels and stationarity in the first difference. Cointegration test results show that there is a long run relationship between life insurance premiums and private credit consumption. As we have established the long-run relationship, we investigated the dynamics of the demand for life insurance and credit consumption using an error correction model. Estimation results suggest that the error correction term is significant and has a negative sign. Private credit consumption has no impact on the dynamic adjustment.

Granger causality test show that there is a bi-directional causality relationship between life insurance development and private credit consumption expansion.

Estimation results show that life insurance development may be explained by GDP per capita, institutional quality, informal credit institutions, physical infrastructural development, credit consumption per capita, life expectancy, inflation, and religion.

5.2. Concluding Discussion

The empirical finding of the study that income elasticity with respect to nonlife insurance consumption is less than unity may indicate the importance of focusing on factors that affect the supply of insurance. That is, the finding suggests that insurance is a necessity service hence a demand for insurance market in the developing world and the potential for insurance growth is likely to be high (see chapter 1).

Many people in developing countries are involved in agriculture for livelihood and they would require insurance market, e.g., crop insurance. The World Development Report (2008,p.3) states that "(o)f the developing world's 5.5 billion people, 3 billion live in rural areas,…Of these rural inhabitants an estimated 2.5 billion are in households involved in agriculture". Agricultural activities are susceptible to weather related risks. Crop risks are correlated and that informal risk sharing institutions are ineffective in managing correlated risks. Therefore, the need is great for an effective and efficient risk transfer mechanisms (e.g., insurance market) to manage agricultural and weather related disaster losses for many people in developing countries.

However, insurance market either is limited or lacking in many parts of developing countries. Indeed, there have been calls by multilateral institutions such as the United Nations Framework Convention on Climate Change (UNFCCC) and the Intergovernmental Panel on Climate Change (see Linnerooth-Bayer, et al (2009), to support insurance markets to mitigate climate change impacts in developing countries.

A plausible explanation for the thin insurance market is that the cost of insurance is high. The findings of the study suggest that physical infrastructural development is an important determinant for a viable insurance sector. Physical infrastructural development enhances not only the demand for insurance but also allows insurers to provide cost effective insurance services, hence the development of insurance market/sector. For instance, health insurance depends on the existence and quality of other infrastructures such as clinics or hospitals. The emergence of microfinance institutions in developing countries aimed, among other things, at minimising the cost of insurance.

Although previous studies recognised the problem of high costs of insurance as a determinant to the development of insurance market, the studies merely stress the importance of institutional quality. In line with existing literature, the findings of the study show that institutional quality has a positive role in the development of insurance services. The result reinforces existing literature that suggests that insurance market is thin in developing countries due to, among other things, high transaction costs. The World Bank Development Report (2000/2001, p.143) highlights the lack of insurance markets in the developing world by stating that:

> "*In practice, there are almost no insurance markets in developing countries because of problems of contract enforcement and asymmetric information. People, especially poor people, have to rely largely on self-insurance and informal insurance instead. These problems have been overcome in developed countries through strong legal and other institutions*."

The impacts of asymmetrical information problems affect much of property insurance, crop and health insurance. For instance, in the presence of information asymmetry and moral hazards problems, the cost of crop insurance becomes high. Moral hazard arises when an individual behaves carelessly because he/she has bought an insurance coverage. Adverse selection occurs when an insurance company cannot distinguish between clients of different risk classes (i.e., high risk from low risk ones) and has to charge premiums based on average risk, which attracts only clients with higher risk than average risk and clients with low risk refrain from buying insurance (due to high price). High administrative costs are incurred due to investments by insurers aimed at controlling adverse selection, and moral hazards. Besides, administrative costs increase when the agricultural sector consists of many small farms, GlobalAgRisk (2009, p.10-14).

Hazell, Pomareda and Valdes (1986, p.296) point out that crop insurance programmes in many countries were disappointing as the cost of insurance was too high relative to the benefits in risk reduction so that farmers proved unwilling to purchase crop insurance coverage voluntarily; therefore, past experience from crop insurance programs in many countries suggests that these programs have to rely on government subsidies; yet, they have been financially unsustainable due to high administrative costs and large losses. Hazell (1992) reports that the total loss ratio ((indemnity + administrative costs)/premiums) was (4.6) in Brazil during the period 1975—81; (2.8) in Costa Rica during the period 1970—89; (4.6) in Japan during the period 1985—89; (3.7) in Mexico during the period 1980—89; (5.74) in Philippines during the period 1981—89; and (2.4) in the U.S. during the period 1980--89, which exceeds the break-even levels (i.e., 1 or below) for insurance operations. Hazell, Pomareda and Valdes (1986) indicate that by the 1980s donors and development practitioners have shown little interest in crop insurance, and attempts to foster crop insurance were almost discontinued.

A possibility is to consider new approaches such as weather index insurance. Weather index insurance (see for full description Collier, Skees, and Barnett (2009) has been suggested to mitigate problems of adverse selection, moral hazards and administrative costs that inhibit traditional insurance operations. The merit of index insurance is that indemnity payments are based on an index (e.g., rainfall) as a proxy for losses rather than individual losses, GlobalAgRisk (2009, p.36).

Cummins, and Mahul (2009, p.155) indicate that during the last decade there has been a renewed interest in agricultural insurance with the emergence of index based insurance. According to GlobalAgRisk (2009,p.45) during the last decade there have been about 30 index insurance pilot projects in developing countries, most of it remain in the pilot stage and applied in India and Mexico.

As regards life insurance, the findings of the thesis suggest that the demand for life insurance in developing countries is more likely to be motivated primarily by credit consumption than the bequest motive. This is not surprising as many potential borrowers have little or no access to credit in large parts of developing countries. This attributes partly to uncertainty about farmers' agricultural income and partly to the lack of collateral, Binswanger (1986).

Although the data used in the thesis is an aggregate one, some surveys support the findings. Roth, McCord and Liber (2007, p.29) report in the Landscape of Microinsurance in the World's 100 Poorest Countries survey an estimated of 78.5 million people hold microinsurance coverage of which some 64 million hold life insurance coverage. The survey suggests that credit life insurance is the most popular coverage sold by microinsurance and account for about 60 percent of life products. The survey also suggests that commercial insurers provide the largest number of clients and microinsurance products (both life and nonlife products).

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